HP Server tc2110
Operations and Maintenance Guide

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Audience Assumptions

This guide is for the person who installs, administers, and troubleshoots LAN servers. Hewlett-Packard Company assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels and are familiar with weight and stability precautions for rack installations.

For installation instructions, refer to the Installation Sheet included with the HP Server tc2110.

Contents

1 Controls and Indicators 1
Front Panel 1
Additional Controls and Indicators 2
Rear Panel 3
Applying Power to the HP Server 4
Connecting the Power Cords 4
Powering-Up the Server 5
Powering-Down the Server 6
Connecting Power to Multiple-Server Configurations 6
Sleep States (ACPI) 6

2 External Connectors 9
Mini-DIN (PS/2) Connectors 9
Serial Port Connector 9
Parallel Port Connector 10
USB Connector 10
68-Pin LVD SCSI Port Connector (Low Voltage Differential) 11
50-Pin Narrow SCSI Port Connector – Accessory Board 12
Standard LAN Connector 13

3 Installing and Configuring 15
Opening and Closing the HP Server 15
Removing the Left Side Cover 15
Replacing the Left Side Cover 16
Removing the Upper Bezel 17
Replacing the Upper Bezel 18
Mass Storage 19
Mass Storage Guidelines 20
Boot Priority 21
IDE Mass Storage Devices 21
SCSI Mass Storage Devices 22
Installing a Second Hard Disk Drive (Drive Cage Mounted) 23
Installing a Third Hard Disk Drive (Tray Mounted) 25
Installing an Optional CD-ROM or DVD Drive 26
Installing an Optional Backup Tape Drive 28
Memory Modules 29
Tools Required 29
Memory Installation Guidelines 29
Installing Additional DIMMs 30
Removing DIMMs 32
Processor 32
Removing the Heat Sink and Cooling Fan 33
Removing the Processor 34
Replacing the Processor 34
Replacing the Heat Sink and Cooling Fan 35
Accessory Boards 36
Tested PCI Boards 36
Tools Required 37
Guidelines 37

IRQ Settings 37
Boot Priority 37
Installing an Accessory Board 38
Removing Accessory Boards 41
Connecting Peripheral Devices 41
Monitor, Keyboard, and Mouse 42
Uninterruptible Power Supply (UPS) 42
Configuring the HP Server tc2110 43
HP Startup CD-ROM 43
Accessing the HP Startup CD-ROM 43
Contents of the HP Startup CD-ROM 44
NOS Installation 44
Diagtools 44
BIOS Setup Utility 44
Accessing the Setup Utility 45
Viewing the Summary Configuration Screen 45
Menu Bar 45
Using the Setup Screens 46
Changing the System Date and Time 46
Setting Boot Passwords 47
SCSI Configuration Utility 48

4 Diagnostics 49
Power-On Self Test (POST) 49
No Error Messages Displayed 50
POST Error Messages 50
Clearing the CMOS and Passwords 51
HP Server Diagtools 53
HP Diagtools Capabilities 53
About Error Messages 54
Advantages and Limitations of Hardware Diagnostics 54
HP Toptools 54

5 Error Messages 55
Power-On Self Test (POST) Error Messages 55
Beep Codes 55

6 Troubleshooting ..... Error! Bookmark not defined.
Preventive Maintenance Procedures ..... **Error! Bookmark not defined.**
Troubleshooting Checklist ..... **Error! Bookmark not defined.**
Server Does Not Power On ..... **Error! Bookmark not defined.**
Server Powers On, but Fails POST ..... **Error! Bookmark not defined.**
Server Passes POST, but Does Not Function ..... **Error! Bookmark not defined.**
BIOS Recovery ..... **Error! Bookmark not defined.**
BIOS Reset ..... **Error! Bookmark not defined.**
BIOS Update ..... **Error! Bookmark not defined.**
BIOS Recovery ..... **Error! Bookmark not defined.**
Password Problems ..... **Error! Bookmark not defined.**
Resetting a Lost Password ..... **Error! Bookmark not defined.**
General Server Problems ..... **Error! Bookmark not defined.**
No lights are on and no error message appears ..... **Error! Bookmark not defined.**
“Operating system not found” message appears ..... **Error! Bookmark not defined.**

Server stops working (hangs)....Error! Bookmark not defined.
Power Problems....Error! Bookmark not defined.
Video/Monitor Problems....Error! Bookmark not defined.
Configuration Problems....Error! Bookmark not defined.
Printer/Datacomm Problems....Error! Bookmark not defined.
Keyboard and Mouse Problems....Error! Bookmark not defined.
Flexible Disk Drive Problems....Error! Bookmark not defined.
CD-ROM Problems....Error! Bookmark not defined.
SCSI Problems....Error! Bookmark not defined.
Processor Problems....Error! Bookmark not defined.
Memory Problems....Error! Bookmark not defined.
Embedded Network Interface Card Problems....Error! Bookmark not defined.
Network Interface Card (Installed) Problems....Error! Bookmark not defined.

7 Replacing Parts....73
Safety Information....73
Service Tools Required....73
Mass Storage Devices....74
Removing the Flexible Disk Drive....74
Replacing the Flexible Disk Drive....75
Removing the CD-ROM....75
Replacing the CD-ROM....76
Removing a Backup Tape Drive....77
Replacing a Backup Tape Drive....77
Removing a Hard Disk Drive (Tray Mounted)....78
Replacing a Hard Disk Drive (Tray Mounted)....79
Removing a Hard Disk Drive (Drive Cage Mounted)....80
Replacing a Hard Disk Drive (Drive Cage Mounted)....81
DIMMs....81
Removing DIMMs....81
Replacing DIMMs....82
Processor....83
Removing the Heat Sink and Cooling Fan....83
Removing the Processor....84
Replacing the Processor....85
Replacing the Heat Sink and Cooling Fan....86
Accessory Boards....87
Removing Accessory Boards....87
Replacing Accessory Boards....88
Power Supply....90
Removing the Power Supply....90
Replacing the Power Supply....91
Battery....91
Removing the Battery....91
Replacing the Battery....92
Chassis Fan....92
Removing the Chassis Fan....92
Replacing the Chassis Fan....93
System Board....94
Removing the System Board....94
Replacing the System Board....95

8 Parts Identification 97
Exploded View – Covers and Bezels 97
Exploded View – Mass Storage Devices 98
Exploded View – Chassis Fan, Power Supply, and System Board 99
Exploded View – System Board Components 100
Replaceable Parts List 101
Cables and Part Numbers 102
Keyboards 103
Power Cords 103
9 Specifications 105
Environmental 105
Weight and Dimensions 105
Power Supply Specifications 105
Hardware Specifications 106
System Board Layout 107
Index 109

1 Controls and Indicators

This chapter describes the controls, ports, and indicators on the front and rear of the HP Server tc2110.

Front Panel

The front panel provides the controls and indicators commonly used when operating the Server.

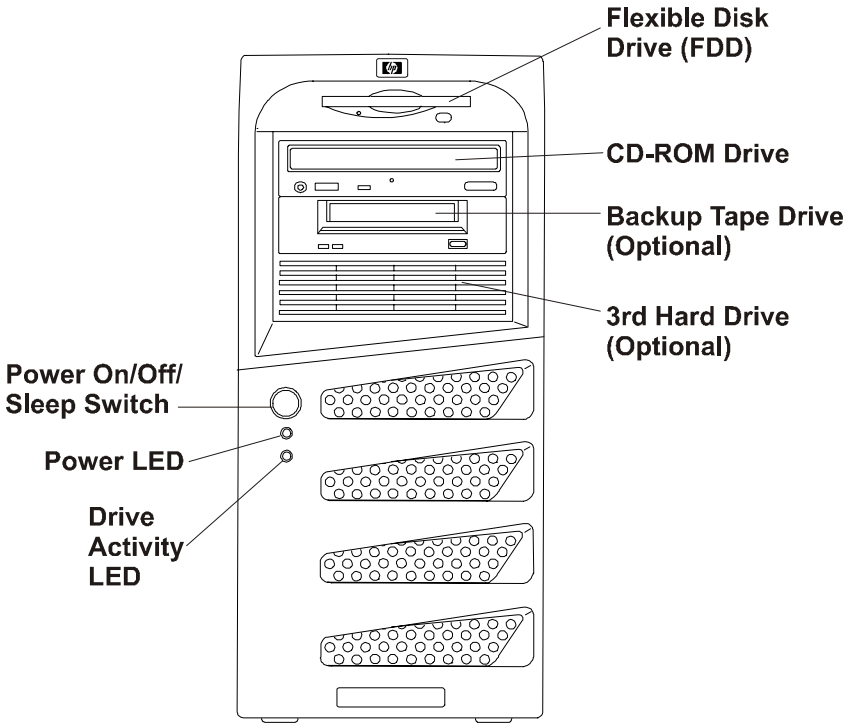
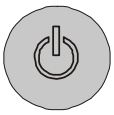


Figure 1-1. Front Panel

Table 1-1 provides the front panel power switch and the lower bezel LED indicator definitions.

Table 1-1. Control Panel Switch and Indicators

Control / Indicator	Description
Power On/Off/ Sleep LED	This green LED indicator provides the power state of the Server: **Steady green** when the Server is operating normally. **Blinking green** when the Server is in standby mode. **Off** when the Server is powered off. **Red** (steady or flashing) indicates a preboot error or a POST error that is preventing the system from booting.
Power On/Off/ Sleep Switch 	The power switch turns the HP server power On or Off. If sleep states are available, it also transitions the Server between Power On and sleep states. Sleep states are NOS dependent and only available if your NOS supports power management based on the ACPI (Advanced Configuration and Power Management Interface) standard. Refer to "Applying Power to the HP Server" and "Sleep States (ACPI)" later in this chapter.
Drive Activity LED	**Flickering amber** LED during any IDE or SCSI device activity, including the CD-ROM drive(s), IDE hard disk drives, and SCSI devices connected to the SCSI controller board. **Off** when there is no IDE or SCSI device activity.

Additional Controls and Indicators

Storage devices provide additional front panel controls and indicators. The specific controls and indicators depend on the type and model of the storage devices used. Figure 1-2 shows the controls and indicators typically found on HP supplied devices.

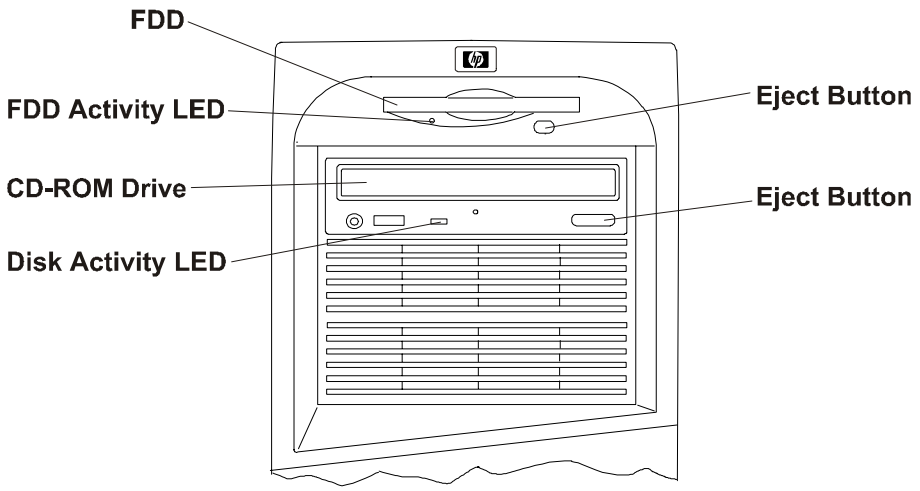


Figure 1-2. Control Panel Indicators

NOTE For more information on the HP Tape Drive and its error codes, refer to the documentation provided with the tape drive or refer to Hewlett-Packard's web site, at: http://www.hp.com/.

Rear Panel

The ports, connectors, switches and other related items at the rear of the Server are listed below and shown in Figure 1-3.

- The power connector accepts a standard power cable to connect the HP Server tc2110 with the site power source.
- The input voltage selector switch is used to adapt the power supply to the input line voltage. The two switch settings are 115 volts or 230 volts, and 230 volts is the default setting.
- The mouse port accepts a standard mouse with a PS/2 connector.
- The keyboard port accepts a standard keyboard with a PS/2 connector.
- Two USB ports are provided for printers, external modems, a keyboard and a mouse, but these features are NOS dependent.
- The Serial A and Serial B ports are standard serial ports.
- The Parallel Port is a standard parallel port which supports Extended Capabilities Port (ECP)/Enhanced Parallel Port (EPP).
- The Monitor Port interface specifications are listed in Chapter 9, "Specifications."
- The SCSI model has an external SCSI port for external SCSI devices provided by the single channel SCSI controller board, but can only be used when no SCSI devices are connected internally.
- Keylock mechanism provides mechanical security for the left side panel to prevent access to the internal components.
- The LAN port is included as an embedded controller based on the Integrated Intel® Pro/100 VE Network Adapter (10 Base-T/100 Base TX LAN Interface). It has a RJ-45 LAN connector on the rear panel.
- System Fan is a variable speed fan controlled by thermal sensors on the system board. The system fan speed can be controlled by the fan speed settings in the (BIOS) Setup Utility.

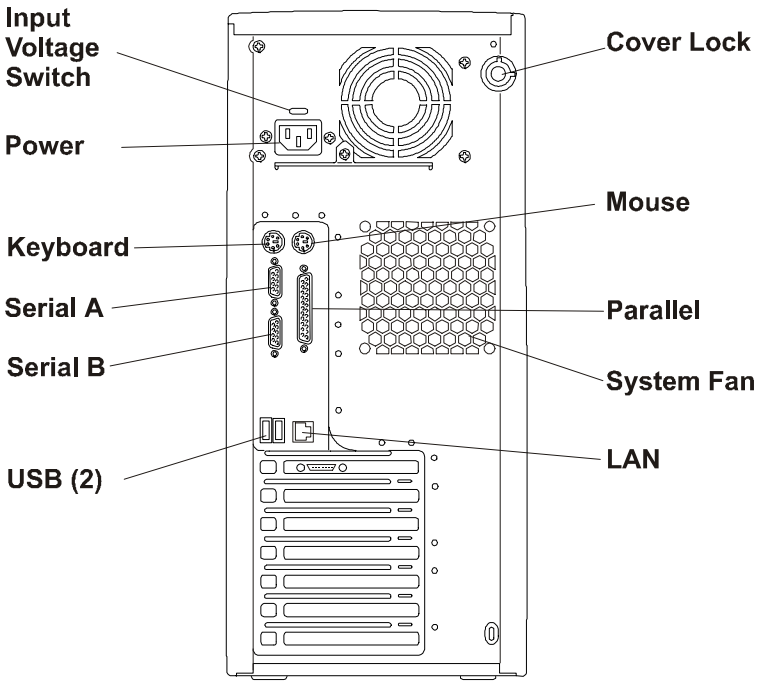


Figure 1-3. Rear Panel and Ports

Applying Power to the HP Server

If you choose to use sleep states in conjunction with the HP Server tc2110, refer to “Sleep States (ACPI)” later in this section and your respective NOS.

Connecting the Power Cords

WARNING	For your safety always connect equipment to a grounded wall outlet. Always use a power cord with a properly grounded plug, such as the one provided with the equipment, or one in compliance with your national safety standards. This equipment can be disconnected from the power by removing the power cord from the power outlet. This means the equipment must be located close to an easily accessible power outlet.

Setting the input voltage

Remove the warning label covering the power connector, and ensure that the voltage setting is correct for your country. (The voltage is set during manufacture and should already be correct.)

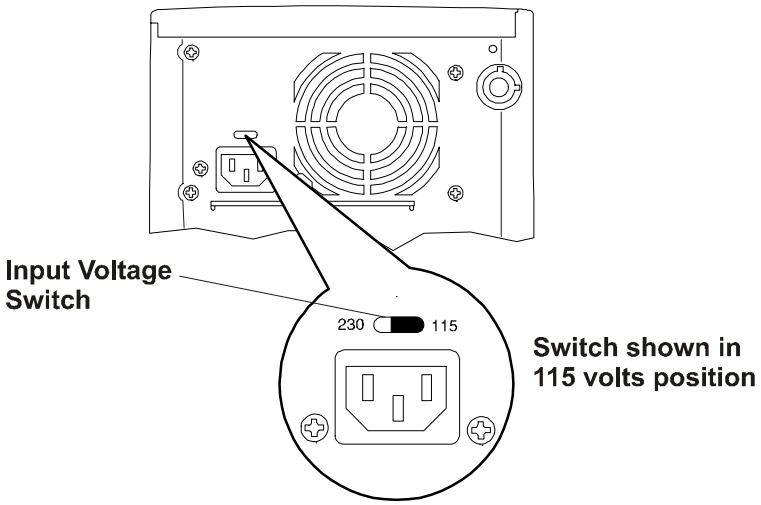


Figure 1-4. Input Voltage Selection Switch

Connecting the Power Cords

1. Connect the power cords to the rear of the monitor and the HP Server. (The connectors are shaped to go in one way only.)
2. Connect the monitor's power cord and the HP Server's power cord to a grounded outlet. See Figure 1-4.

NOTE Hewlett-Packard does not support power supply upgrades. Power supply installation information is only intended to assist with the replacement of a defective power supply unit. For your safety, only replace your power supply unit with the one provided by HP Support Services.

Powering-Up the Server

1. Turn on power to the monitor connected to the HP Server.

   Turning on the monitor first ensures that video output auto-configures properly as the server boots up. For information about connecting the monitor, see "Connecting Peripheral Devices" in Chapter 3.

2. Ensure that the Input Voltage selector switch is set for the correct input voltage.
3. Press the Power button on the lower front bezel. See Figure 1-1.

   When you press the power button on the front bezel, the Server powers up and loads the operating system. The system runs a set of Power On Self Tests (POST) during this process. For details refer to Chapter 8, "Configuring the HP Server" and Chapter 9, "Troubleshooting."

Powering-Down the Server

1. Make sure that you have exited all applications.
2. Use the shut down command in your operating system's Start menu (for Windows NT 4.0 and Windows 2000, and Windows XP operating systems).
3. When prompted, press the power button on the HP Server.

WARNING	The power supply will continue to provide standby current to the Server until the power cord is disconnected from the rear panel.

If you want to force the HP Server to shut down (for example after the operating system has crashed), press and hold down the power button for approximately 5 seconds.

Connecting Power to Multiple-Server Configurations

The HP Server temporarily draws a large "inrush current," when first connected to an AC power source. This also occurs when the Server is in a standby mode (power is turned off, but the power cord is plugged into AC power). The inrush current is much greater than the Server's normal operating current and generally, the AC power source can handle the normal inrush current.

However, if you install several HP Servers on one circuit, precautions are necessary. If there is a power failure and power is then restored, all the servers immediately begin to draw inrush current at the same time. If the circuit breakers on the incoming power line have insufficient capability, the breaker may trip and thus prevent the servers from powering up.

When preparing your site for installation, allow for the additional inrush current. Refer to Chapter 9.

Sleep States (ACPI)

The HP Server supports the ACPI (Advanced Configuration and Power Interface) standard, which is a key component of a NOS's directed power management. The supported features are only available when an ACPI-compliant NOS is installed on the Server. The term "sleep state" refers to any of several reduced power consumption states in which normal NOS activity has ceased.

The Server supports several sleep states. One of these is a "standby" or "suspend" sleep state, which has a short wake-up time. In this sleep state the Server appears to be off – the monitor appears blank and there is no CD-ROM, internal hard drive activity (IDE or SCSI), however, the power LED is a blinking green and the system fan continues to operate.

The Server also may support another sleep state with a slower wake-up time, sometimes referred to as "hibernate" by various operating systems. In this sleep state, the Server appears to be off as described earlier, but the system fan and the front panel power LED are also turned off. The unique feature of this sleep state (and the reason for its slower wake-up time) is that information about the Server's NOS state (open applications, screens, and so on) is saved to disk before the Server is placed in the sleep state. Upon wake-up, this information is restored from disk. This method of restoring the Server's operation is much faster than a complete rebooting of the Server. It still requires running all the start-up self-tests before starting the NOS, but loading the NOS and all the previously opened applications is much faster.

The Server supports certain types of system activity, which are used as wake-up events from these sleep states. These wake-up events can be generated from the power button, keyboard or mouse activity, and scheduled events.

NOTE	The HP Server's power management policies (transitions between various power states) and the user options are specific to the particular ACPI-compliant NOS installed on the Server. If your NOS is ACPI-compliant, refer to the (BIOS) Setup Utility and the power management features provided in the NOS instructions for more information.

The HP Server's power button can be configured to initiate a graceful shutdown or "soft off" of the NOS rather than an immediate shutdown of the power supply. The power button configurations are dependent on

the user interface provided by the ACPI-compliant NOS. While power management is under the control of the ACPI-compliant NOS, the HP Server's power button is capable of an override in case of a non-responsive NOS.

NOTE	The HP Server power button will force a power down without waiting for the NOS to gracefully shut down the Server, if the power button is pressed and held for more than five seconds.

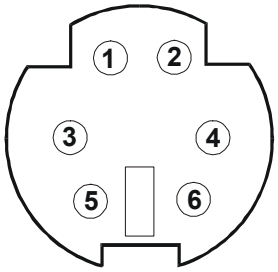
CAUTION	If the power button override is used, there is a strong possibility of corrupted or lost data.

Refer to the BIOS Setup Utility in Chapter 3, "Installing and Configuring" and your NOS documentation for instructions on setting up Sleep States and transitioning into and out of the various states.

2 External Connectors

Unless otherwise noted, the following features apply to all models. Some features are factory installed; others are optional.

Mini-DIN (PS/2) Connectors

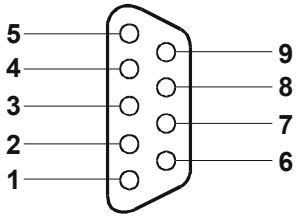


Mini-DIN Connector (female) for the Mouse and Keyboard

Mini-DIN Connector Pinouts for the Mouse and Keyboard

Pin Number	Signal Description
1	Data signal
2	Not used
3	Ground
4	Power (+5 V dc)
5	Clock signal
6	Not used

Serial Port Connector

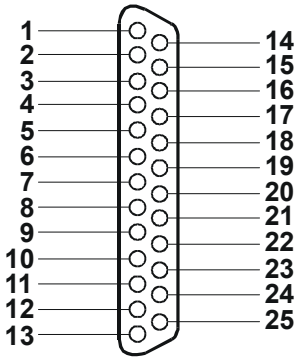


Serial Port Connector

Serial Port Connector (male) Pinouts

Pin Number	Signal Description
1	Data carrier detect
2	Receive data
3	Transmit data
4	Data term ready
5	Signal ground
6	Data set ready
7	Request to send
8	Clear to send
9	Ring indicator

Parallel Port Connector



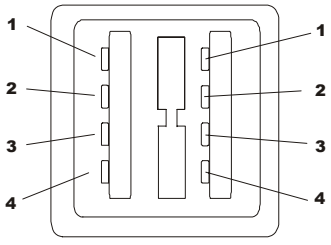
Parallel Connector

Parallel Port Connector (female) Pinouts

Pin Number	Signal Description	Pin Number	Signal Description
1	Strobe5	10	Acknowledge[b]
2	Data bit 06	11	Busy
3	Data bit 1[a]	12	Paper end
4	Data bit 2[a]	13	Select
5	Data bit 3[a]	14	Auto line feed[b]
6	Data bit 4[a]	15	Error1
7	Data bit 5[a]	16	Initialize printer[b]
8	Data bit 6[a]	17	Select in[b]
9	Data bit 7[a]	18-25	Signal ground

a. All data bits are sent to a printer in an 8-bit parallel format.
b. The signal is active low.

USB Connector



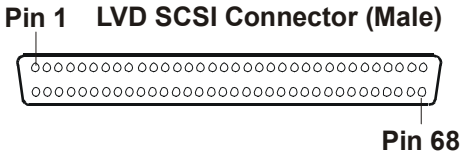
USB Connector

Universal Serial Bus Connector Pinouts

Pin Number	Signal Description
1	VBUS
2	D+
3	D-
4	GND

NOTE Use of the USB port is supported for printers, scanners, and external modems.

68-Pin LVD SCSI Port Connector (Low Voltage Differential)



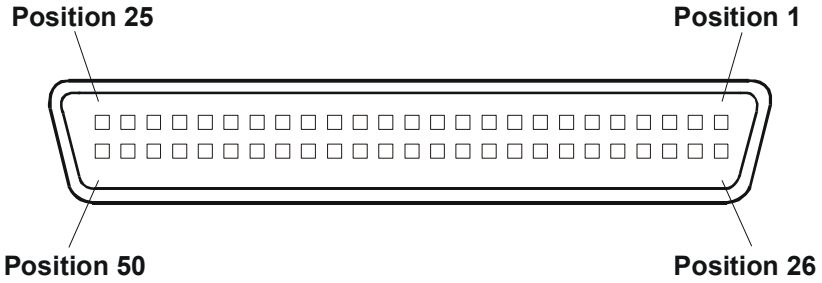
68-Pin SCSI Port Connector

Shown as pin matching

Pin Number	Signal Description	Pin Number	Signal Description
1	+DB(12)	35	-DB(12)
2	+DB(13)	36	-DB(13)
3	+DB(14)	37	-DB(14)
4	+DB(15)	38	-DB(15)
5	+DB(P1)	39	-DB(P1)
6	+DB(0)	40	-DB(0)
7	+DB(1)	41	-DB(1)
8	+DB(2)	42	-DB(2)
9	+DB(3)	43	-DB(3)
10	+DB(4)	44	-DB(4)
11	+DB(5)	45	-DB(5)
12	+DB(6)	46	-DB(6)
13	+DB(7)	47	-DB(7)
14	+DB(P0)	48	-DB(P0)
15	Ground	49	Ground
16	DiffSens	50	Ground
17	TermPwr	51	TermPwr
18	TermPwr	52	TermPwr
19	Reserved	53	Reserved
20	Ground	54	Ground
21	+ATN	55	-ATN
22	Ground	56	Ground
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MSG
27	+SEL	61	-SEL
28	+CD	62	-CD
29	+REQ	63	-REQ
30	+IQ	64	-IQ
31	+DB(8)	65	-DB(8)
32	+DB(9)	66	-DB(9)
33	+DB(10)	67	-DB(10)

Pin Number	Signal Description	Pin Number	Signal Description
34	+DB(11)	68	-DB(11)

50-Pin Narrow SCSI Port Connector – Accessory Board

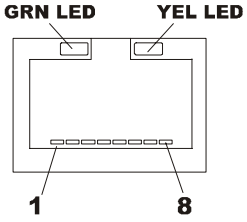


SCSI Port Connector

50-Pin Narrow SCSI Port Connector Pinouts

Pin Number	Signal Description	Pin Number	Signal Description
1-11	Ground	37	Reserved
12	Reserved	38	Termpwr
13	Open	39	Reserved
14	Reserved	40	Ground
15-25	Ground	41	-ATN
26	-DB(0)	42	Ground
27	-DB(1)	43	-BSY
28	-DB(2)	44	-ACK
29	-DB(3)	45	-RST
30	-DB(4)	46	-MSG
31	-DB(5)	47	-SEL
32	-DB(6)	48	-C/D
33	-DB(7)	49	-REQ
34	-DB(P)	50	-I/O
35-36	Ground		

Standard LAN Connector



LAN Connector

LAN Connector Pinouts

Pin Number	Signal Description
1	Data signal
2	Not used
3	Ground
4	Power (+5 V dc)
5	Clock signal
6-8	Not used

3 Installing and Configuring

Opening and Closing the HP Server

This section describes how to remove and replace the left side cover and the upper front bezel of the HP Server tc2110.

WARNING	Before removing the cover, always disconnect the power cord and unplug telephone cables. Disconnect the power cord to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

The left side cover and upper front bezel are the only covers that must be removed to access the internal components or the mass storage devices at the front of the Server in the front drive bays (or shelves). The left side cover must be removed before removing the front bezel.

Removing the Left Side Cover

To remove the cover, follow these steps:

NOTE	These steps do not include the removal of the front bezel of the Server. You do not need to remove the front bezel of the HP Server tc2110 to install internal accessories, such as memory or mass storage.

1. Switch off the monitor and HP Server, and disconnect all power cords and any telecommunication cables.

   If necessary, label each one to expedite re-assembly.

2. If necessary, unlock the left side cover (using the key) at the rear of the Server.

   Initially, the keys are attached to the rear of the HP Server.

3. Pull outward on the latch, grasp the edges of the cover and lift the cover upward to remove it. See Figure 3-1.

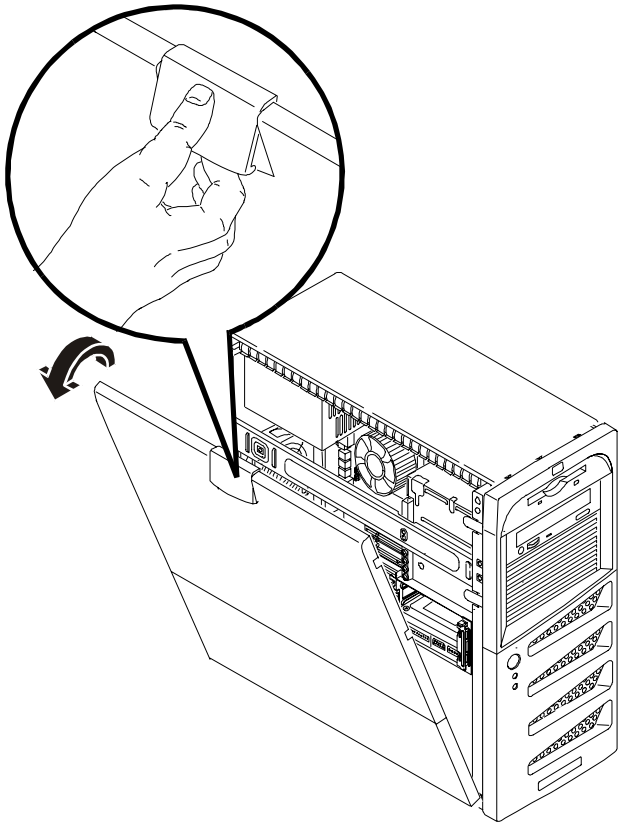


Figure 3-1. Removing the Left Side Cover

4. Place the left side cover in a safe place for re-installation later.

WARNING	Parts inside the server may be hot; wait for them to cool before touching them.

Replacing the Left Side Cover

To replace the left side cover, follow these steps:

1. If you have been installing accessories or servicing the Server, return the Server to its normal upright position.
2. Use two hands to place the side cover's lower edge at an angle to the hinge tabs along the bottom of the chassis.

   The hinge tabs are keyed to accept the side cover in only one position.
3. With the side cover resting on the hinge tabs, tilt the side cover up until it engages the locking mechanism at the top of the chassis.

4. Lift the latch to engage the lock and completely close the side cover.

   The side cover should snap into place when securely closed.

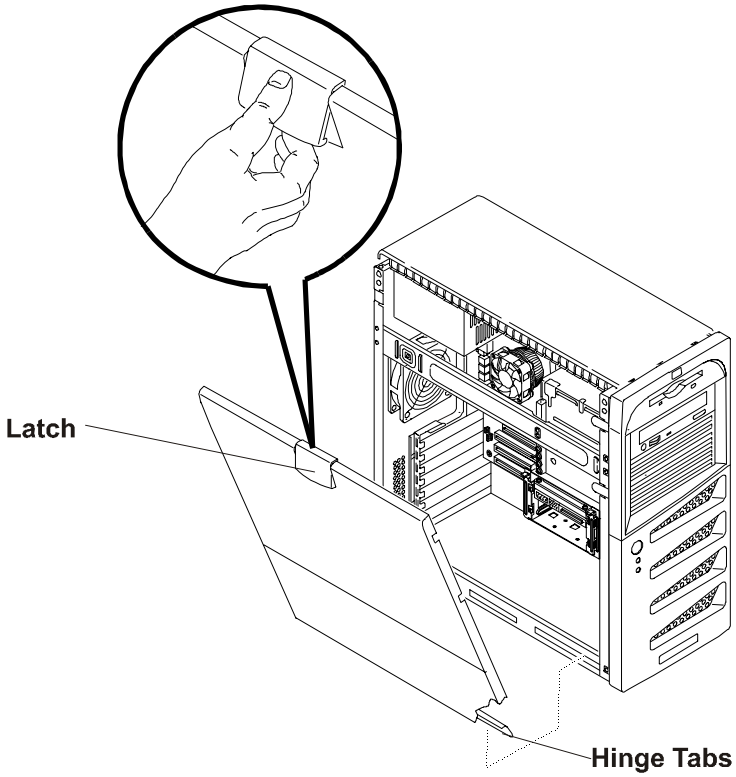


Figure 3-2. Replacing the Left Side Cover

5. Lock the cover using the key provided, if required. Reconnect all the power and telecommunication cables.

Removing the Upper Bezel

The upper front bezel must be removed to install or replace mass storage devices in the first four shelves (common trays).

To remove the upper bezel:

1. Switch off the monitor and HP Server, and disconnect all power cords and any telecommunication cables.

   If necessary, label each one to expedite re-assembly.

2. Remove the left side cover, as described earlier in this chapter.
3. Locate the upper bezel release tabs just behind the front bezel, as shown below.
4. Pull the release tabs outward, releasing the upper bezel and pull the tabs/upper bezel forward.

   The upper front bezel swings open on its hinge teeth.

5. Swing the upper bezel completely open and remove it from the front of the Server.

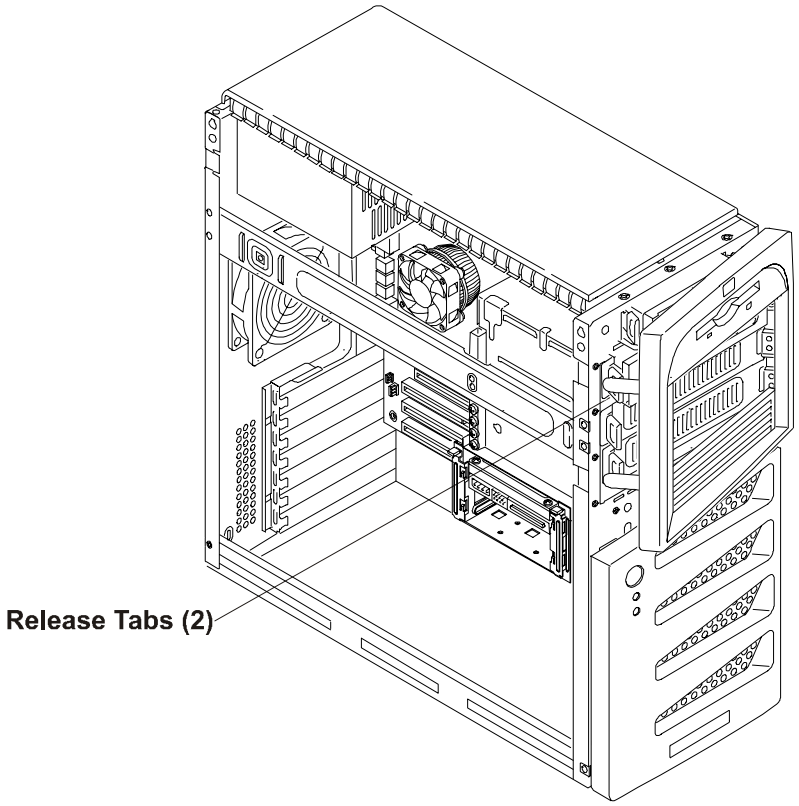


Figure 3-3. Removing the Upper Front Bezel

Replacing the Upper Bezel

1. Hold the upper bezel next to the chassis, and align the hinge teeth, both upper and lower, as shown in the following illustration.

   The hinge teeth can only fit together within the space allowed, so it should fit on the first try.

2. Close the upper bezel, swinging it to the left, where it will engage the release tabs.
3. Push the upper bezel closed so it engages the release tabs.

   The release tabs should snap into place.

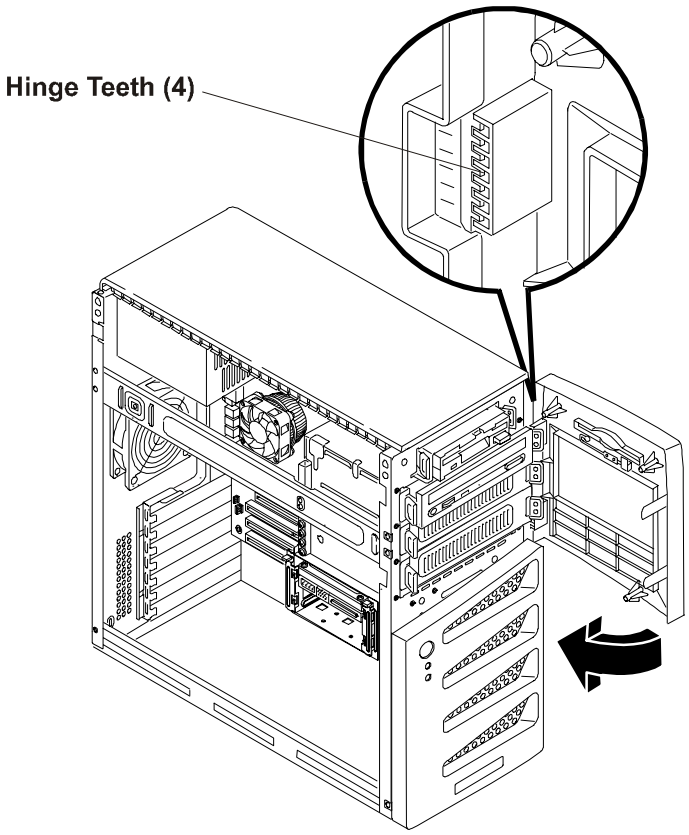


Figure 3-4. Replacing the Upper Bezel

Mass Storage

This section describes how to install the internal mass storage devices, including the internal hard disk drives (IDE or SCSI) and the optional tape backup (DAT) drive. The HP Server tc2110 comes standard with one flexible disk drive, one IDE CD-ROM, and at least one SCSI or IDE hard disk drive, depending on the model. The mass storage cage can hold two hard disk drives. A third hard disk drive may be installed in the fourth drive bay, located behind the upper front bezel.

Please refer to the appropriate topics listed in this section according to your Server configuration (IDE or SCSI).

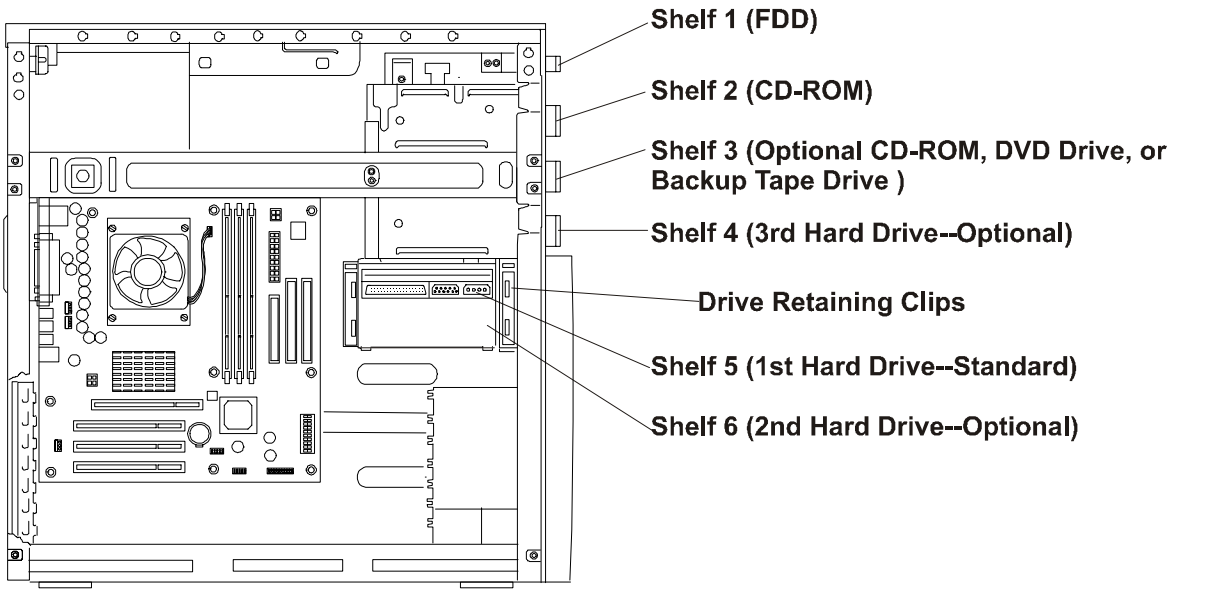

Shelf 1 (FDD)
Shelf 2 (CD-ROM)
Shelf 3 (Optional CD-ROM, DVD Drive, or Backup Tape Drive)
Shelf 4 (3rd Hard Drive--Optional)
Drive Retaining Clips
Shelf 5 (1st Hard Drive--Standard)
Shelf 6 (2nd Hard Drive--Optional)

Figure 3-5. Mass Storage Locations

Mass Storage Guidelines

- General Guidelines
  - Use care when unpacking and handling the hard disk drives.

    The hard disk drives are very susceptible to mechanical shock and can be easily damaged by a drop as short as one-quarter of an inch. If the drop would crack an egg, it will damage the drive.
  - Do not stack drives.
  - The Server is internally limited to 6 mass storage shelves.

    The flexible disk drive and CD-ROM drive, which are standard on all models of the HP Server tc2110, occupy shelves 1 and 2 respectively. The first four mass storage shelves may also be referred to as common trays, or drive trays. See Figure 3-5.
- IDE Devices
  - The embedded IDE controller is an Enhanced-IDE dual channel controller and provides two connectors (IDE-1 and IDE-2) for IDE devices.

    Refer to “System Board Layout” in Chapter 9, “Specifications.”
  - The IDE CD-ROM uses one connector on the cable from the IDE-2 connector, leaving one connector for an optional third hard drive or IDE device on the IDE model. The CD-ROM is configured as the master device, unless a third HDD is installed, which should be configured as the master device.

    For the SCSI model the second IDE-2 connector could be used for any additional IDE device, such as IDE hard drive.
  - The primary IDE connector (IDE-1) and cable is used for the first or standard hard IDE drive and the second optional hard drive, but this cable is not provided for the SCSI model.

    The bundled IDE CD-ROM and hard disk drive were put on separate IDE connectors to improve performance.
- SCSI Devices
  - Use only low-voltage differential (LVD) SCSI devices.
  - Do not use high voltage differential (HVD) SCSI devices in the Server or damage to the controller and other devices may occur.

- Ensure that the SCSI devices you install do not have terminations installed.

  The SCSI drives are connected to a terminated cable and do not require termination on the SCSI drive.

- Use only HP Ultra 160 SCSI LVD (1-inch) low profile 3.5-inch hard disk drives for the hard disk drive cage.

- The optional HP backup tape drive comes with a 50-to-68-pin adapter to connect to the 68-pin SCSI connector on the SCSI cable used for connection of backup tape drive.

  The optional HP backup tape drive may slow down access time for the Ultra-160 SCSI hard drives. If this is the case, HP recommends adding another single channel SCSI controller to control the slower backup tape drive.

Boot Priority

The HP Server tc2110 is provided in two models, IDE or SCSI, and the model type affects the boot priority. The HP Server searches for bootable devices in a specific order, which is set up in the BIOS Utility.

IDE Model Boot Order:

1. Flexible disk drive
2. IDE CD-ROM drive
3. IDE hard drive (boot drive)
4. PCI slot P1 (32-bit slot)
5. PCI slot P2 (32-bit slot)
6. PCI slot P3 (32-bit slot)

SCSI Model Boot Order:

1. Flexible disk drive
2. IDE CD-ROM drive
3. IDE hard drive (if boot drive)
4. SCSI devices
5. PCI slot P1 (32-bit slot)
6. PCI slot P2 (32-bit slot)
7. PCI slot P3 (32-bit slot)

The SCSI Controller in the Server scans for a boot device starting at device ID 0 and works up through the ID numbers (0-15). The SCSI controller board is always SCSI ID 7. The optional backup tape drive will use SCSI address ID 3.

NOTE The boot order can be changed by pressing F8 during the POST or by using the Server's (BIOS) Setup Utility. Refer to "BIOS Setup Utility" later in this chapter for more information. You may also activate the Network Boot by pressing F12 during the POST.

IDE Mass Storage Devices

This section provides the configuration of the IDE mass storage devices, if you have selected an IDE version of the HP Server tc2110.

IDE Controller Configuration

The embedded IDE controller is available for both models (IDE or SCSI) of the HP Server. The embedded IDE controller is an Ultra ATA 33/66/100 dual channel controller, which provides IDE-1 and IDE-2 connectors. Each channel can only control two IDE devices.

The IDE Server model uses the IDE-1 for the boot drive and the IDE-2 connector for the IDE CD-ROM. The Setup Utility (BIOS) can be used to change the boot order of the flexible disk drive and the IDE devices. Refer to "BIOS Setup Utility" later in this chapter for more information.

IDE Mass Storage Additions

Table 3-1 lists the number and types of mass storage devices that may be added to the IDE model of the HP Server.

Table 3-1. IDE Model Mass Storage Devices

Interface Types	Max No. Devices	Installed Devices and Addresses
FDD	1	Factory installed flexible disk drive (FDD) in shelf 1
IDE-2	2	• Factory installed CD-ROM drive in shelf 2 • Optional IDE device (backup tape drive, CD-ROM, or DVD drive) in shelf 3 • Optional 3rd IDE hard drive in shelf 4
IDE-1	2	• Factory installed IDE hard drive in shelf 5 • Optional 2nd IDE hard drive in shelf 6
SCSI controller board	1	• Optional SCSI backup tape drive in shelf 3 (SCSI controller board required for SCSI back up tape drive)

SCSI Mass Storage Devices

This section provides the configuration of the SCSI mass storage devices, if you have selected a SCSI version of the HP Server tc2110. The base SCSI model configuration has at least one SCSI hard drive (shelf 5) located in the drive cage and connected to the factory installed SCSI controller.

SCSI Controller Configuration

The single channel SCSI controller board provided with the SCSI model uses the SCSI Select Utility to control the SCSI controller board settings. If you order the SCSI model, you typically do not need to configure the SCSI controller, because the utility will automatically recognize all SCSI devices connected to it.

Run the SCSI Select Utility to verify or modify the SCSI controller settings, low-level format SCSI disks, or verify SCSI media. Refer to "SCSI Configuration Utility" later in this chapter for further information.

CAUTION	You must not connect high voltage differential (HVD) SCSI devices on the SCSI bus or you will damage the other LVD SCSI devices.

The single channel Ultra-160 PCI SCSI controller board provided with the SCSI model includes two SCSI connectors and is normally installed in PCI slot P1. The SCSI cable provided has 5 connectors, (4 for SCSI devices and 1 for the SCSI controller board) and one terminator on the end of the cable.

- 1 internal 68-pin connector – This internal connector is used to control the internal SCSI drives; up to a total of four SCSI devices.
- 1 external 68-pin connector – This external SCSI connector is only used for external SCSI devices and requires no additional internal cabling or switch settings. This connector supports up to 15 devices connected to it externally.

NOTE	Only one 68-pin connector on the SCSI controller board can be used as the active SCSI connector. Therefore, you cannot connect external SCSI devices to the external connector when there are active internal SCSI devices connected to the internal SCSI connector.

The HP Server tc2110 will support an HP NetRAID 1M controller board, separate from the SCSI controller board.

SCSI Mass Storage Additions

Table 3-2 lists the number and types of mass storage devices that may be added to the SCSI model of the HP Server.

Table 3-2. SCSI Model Mass Storage Devices

Interface Types	Max No. Devices	Installed Devices and Addresses
FDD	1	Factory installed flexible disk drive (FDD) in shelf 1
IDE-2	2*	• Factory installed CD-ROM drive in shelf 2 • A second IDE device could be installed, if shelf 3 is available.
Internal SCSI cable (Ultra-160 SCSI Adapter)	4***	• Factory installed SCSI HDD (shelf 5, address = ID 0 • Optional 2nd SCSI HDD (shelf 6, addresses = ID 1). • Optional 3rd SCSI HDD (shelf 4, address = ID 2) • Optional SCSI Tape Backup Drive (shelf 3, address = ID 3) ** • SCSI controller (address = ID 7)
External SCSI connector (Ultra-160 SCSI Adapter)	15***	• Only used for control of external SCSI devices. This SCSI connector can control up to 15 external SCSI devices.

* The secondary IDE (IDE-2) cable is connected to the factory-installed CD-ROM drive. The primary IDE connector (IDE-1) is available on the SCSI model, but is not supported by Hewlett-Packard.

** A 50-to-68-pin SCSI adapter is provided with the HP backup tape drive.

*** The single channel SCSI controller can support up to 15 devices on one connector at a time; however, there are only enough internal storage shelves for 3 hard drives and 1 optional backup tape device. The external connector is only used to control external SCSI devices when there are no internal SCSI devices.

Installing a Second Hard Disk Drive (Drive Cage Mounted)

The first hard disk drive (IDE or SCSI) is always mounted in the top (shelf 5) of the hard disk drive cage. The second hard disk drive should be mounted just below it (shelf 6).

1. If the Server is already installed and operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators.”

2. Disconnect the power cables and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the side cover from the Server.

   Refer to “Opening and Closing the HP Server” earlier in this chapter.

4. Press and release the retaining clips at the sides of the drive cage. See Figure 3-6.

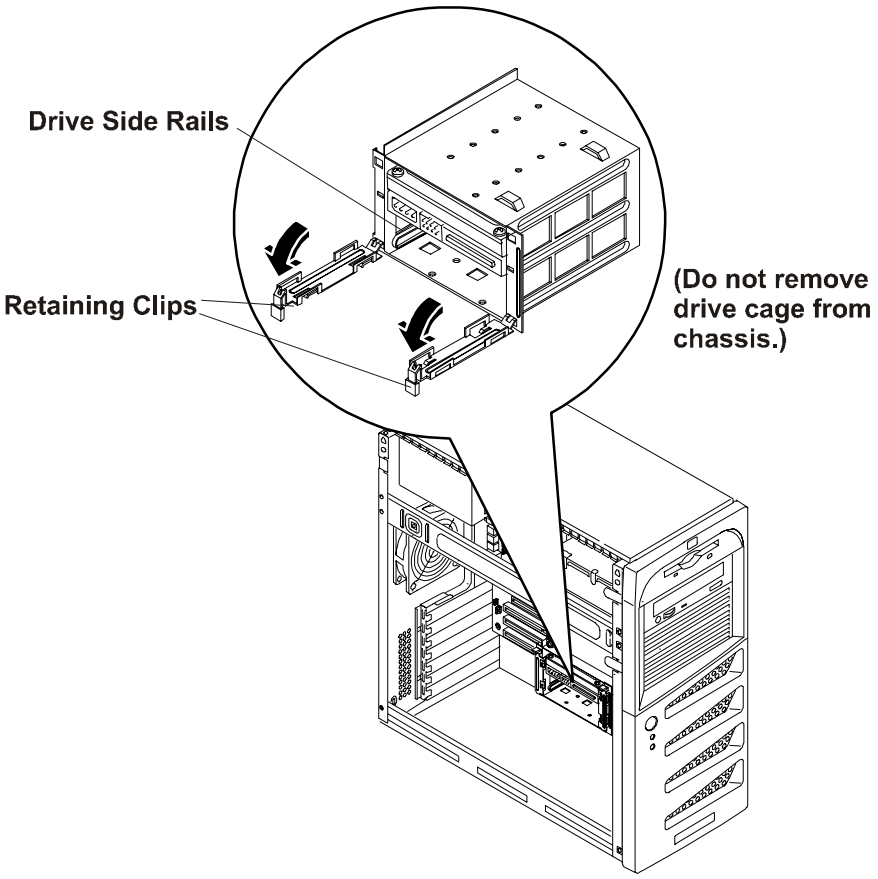


Figure 3-6. Releasing the Retaining Clips

5. Remove the hard disk drive from its protective bag and check, or set the following items:
   a. Check for bent pins on any of the connectors and carefully straighten any bent pins.
   b. If mounting a SCSI hard drive, ensure it is not terminated and set the SCSI ID jumper for address = ID 1.

      Refer to the documentation provided with the hard drive.
6. Remove the two side rails from the vacant space in the drive tray and screw them to the new hard drive. See Figure 3-7.

   The screws are located just above the drive cage.

NOTE If the hard disk drive you are planning to install already has a mounting bracket attached, you must remove it in order to attach the side rails to the drive.

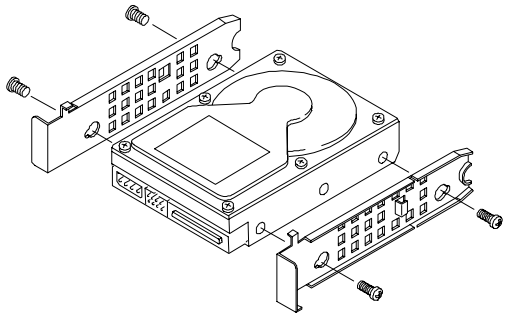


Figure 3-7: Attaching Side Rails to the Hard Drive

7. Slide the drive into the lower cage opening with the data and power connectors facing out of the drive cage. See Figure 3-8.

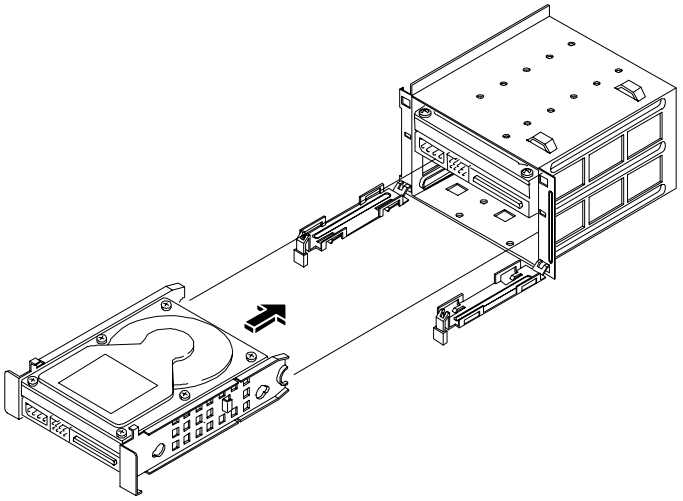


Figure 3-8. Drive Cage Mounting

8. Attach the data connectors to the drives.

   Assuming that you want to boot from the original hard drive, attached the end connector (marked DRIVE 0) to this drive and the other connectors to the remaining drive(s). If mounting a SCSI hard drive, connect the SCSI cable to both drives.

9. Connect the power cable to the rear of the hard drive.
10. Replace the left side cover and external cables.
11. Replace the power cord and restore power to the Server.
12. Verify the new configuration by checking the HP Summary screen. To access the HP Summary Screen, press F2 then Esc when the HP logo appears during startup.

    The BIOS and SCSISelect utilities automatically detect the new hard drives (IDE or SCSI) but you should check the BIOS and SCSISelect settings and make any necessary changes.

Installing a Third Hard Disk Drive (Tray Mounted)

The first and second hard disk drives (IDE or SCSI) are mounted in the drive cage; the third hard drive must be mounted in the fourth drive tray. The secondary IDE cable, which is connected to the IDE CD-ROM in the second drive tray, has an available connector that may be used for an IDE device in either the third or fourth tray.

1. If the Server is already installed and operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators.”

2. Disconnect the power cables and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the side cover and the upper front bezel.

   Refer to “Opening and Closing the HP Server” earlier in this chapter.

4. Press in on both tab latches to release the fourth drive tray, and then pull it out. See Figure 3-9.
5. Remove the hard disk drive from its protective bag, and check, or set, the following items:
   a. Check for bent pins on any of the connectors and carefully straighten any bent pins.
   b. If mounting a third SCSI hard drive, ensure that it is not terminated and set the SCSI ID jumper for address = ID 2.

      Refer to the documentation provided with the hard drive.

NOTE If the hard disk drive (HDD) you are planning to install already has a mounting tray attached, you must remove it from the tray.

6. Install the hard disk drive as described below:
   a. Place the hard disk drive into the tray and use the screws provided to secure it to the tray from the bottom.
   b. Insert the hard disk drive assembly into the fourth shelf. See Figure 3-9.

      The tabs should snap into place when the drive is pushed all the way into the fourth shelf.

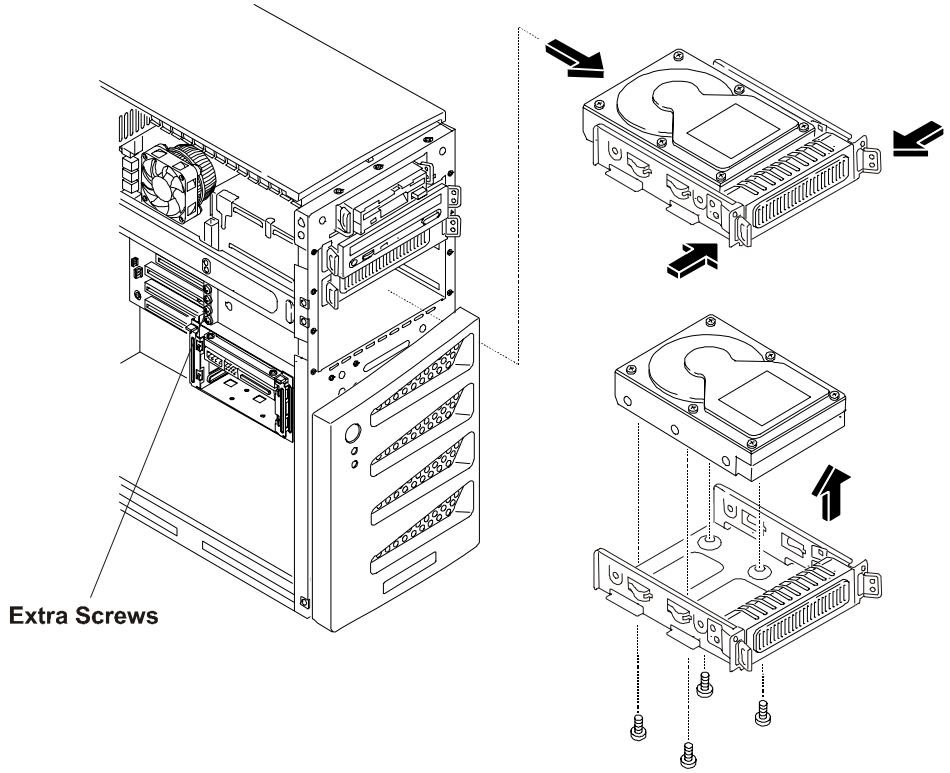


Figure 3-9. Installing a Disk Drive (Tray Mounted)

7. Connect the data cable to the hard drive, as described below:
   - If mounting a third IDE hard drive, connect the secondary (IDE-2) cable to the hard drive.
   - If mounting a third SCSI hard drive, connect the SCSI cable to the drive and ensure all SCSI drives are connected to the SCSI cable.

     There are five connectors on the standard SCSI cable; with four of the connectors intended for the three hard disk drives and one optional backup tape drive. The standard SCSI cable has a terminator at the end of the cable.
8. Connect the power cable to the rear of the hard disk drive.
9. Replace the upper bezel and left side cover.
10. Replace the external cables, and power cord, and then restore power to the Server.

    The BIOS and SCSISelect utilities automatically detect the new hard drives (IDE or SCSI), but you should check the BIOS and SCSISelect settings and make changes as necessary.

Installing an Optional CD-ROM or DVD Drive

You may install an optional IDE CD-ROM or DVD drive in the third drive tray. The secondary IDE cable, which is connected to the IDE CD-ROM in the second drive tray, has an available connector that may be used for an IDE device in either the third or fourth tray.

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.

2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the left side cover.

   Refer to “Opening and Closing the HP Server” earlier in this chapter.

4. Remove the upper bezel.

   Refer to “Opening and Closing the HP Server” earlier in this chapter.

5. Press in on both tab latches to release the third drive tray and pull it out at the same time. See Figure 3-10.

6. Remove the RFI shield from the third drive tray.

7. Remove the CD-ROM from the shipping container.

8. Make any settings required by the CD-ROM documentation (primary or slave, etc.).

9. If not already mounted, place the CD-ROM into the CD-ROM tray and secure it using the four screws.

10. Guide the CD-ROM tray into the chassis opening, with the cable connectors of the CD-ROM toward the rear of the chassis.

11. Push the CD-ROM tray all the way into the chassis until the CD-ROM tray snaps into place.

    The two release tabs should click when in place.

12. At the rear of the CD-ROM, carefully connect the power and data cables.

    The IDE CD-ROM uses one connector on the cable from the IDE-2 connector, leaving one connector that may be used for an IDE device in the third tray.

13. Replace the upper bezel.

14. Replace the left side cover.

15. Replace the external cables and power cord.

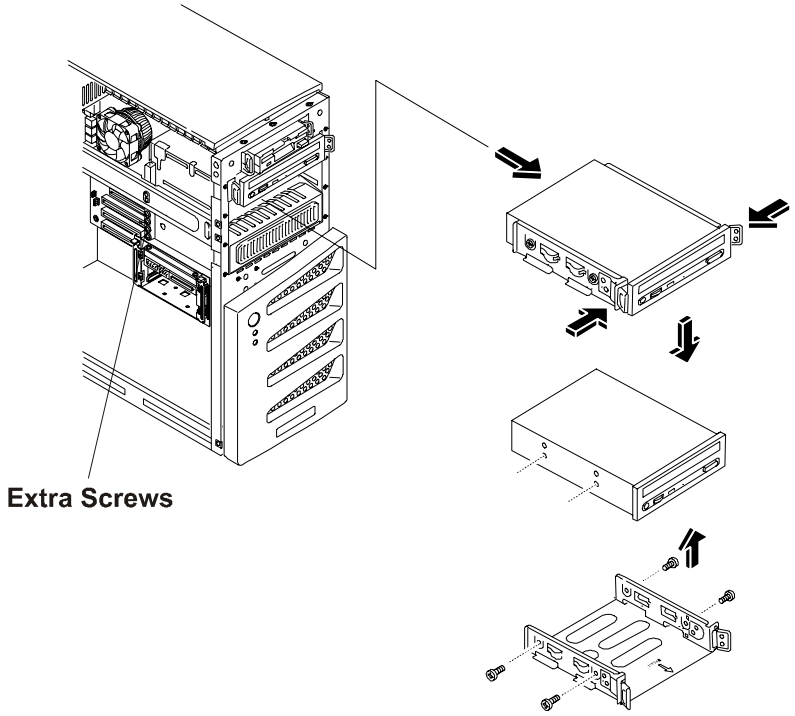


Figure 3-10. Installing an Optional CD-ROM or DVD Drive

Installing an Optional Backup Tape Drive

The optional HP SureStore DAT 24i backup tape drive is a single-ended device and may slow down the disk access time for the Ultra-160 SCSI drives. A second SCSI controller board may be required to separately control the backup tape drive.

1. If the Server is already installed and operating, power-down the Server.

   Refer to Chapter 1, "Controls and Indicators."

2. Disconnect the power cables and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the left side cover from the Server.

   Refer to "Opening and Closing the HP Server" earlier in this chapter.

4. Remove the upper front bezel.

   Refer to "Opening and Closing the HP Server" earlier in this chapter.

5. Press in on both tab latches to release the third drive tray and pull it out at the same time. See Figure 3-11.

6. Remove the RFI shield from the third drive tray. See Figure 3-11.

7. Ensure that the backup tape drive is not terminated and ensure that the SCSI ID jumper is set for address = ID 3 on the tape drive.

   The optional HP SureStore DAT 24i backup tape drive is shipped with the default setting of SCSI address = ID 3. Refer to the documentation provided with the tape drive.

8. Install the backup tape drive, as described below:

   a. Place it into the tray and use the screws provided to secure it to the tray. See Figure 3-11.

      The optional HP SureStore DAT 24i backup tape drive is a single-ended drive and normally comes with the 5¼ inch mounting brackets installed on the tape drive. If not, follow the instructions provided with the tape drive to connect the 5¼-inch mounting brackets to the tape drive, before installing the tape drive into the third drive tray.

   b. Insert the backup tape drive mounted in the tray into the third shelf.

      The tabs should snap into place when the third drive tray is pushed all of the way into the third shelf.

CAUTION	Install and remove connectors carefully, and avoid displacing any of the pins.

9. Connect the SCSI data and power cables to the rear of the back up tape drive.

   The SCSI data and power cables for the tape drive should already be routed to the tape drive. If not locate the free SCSI and power connectors and route to the tape drive.

NOTE	The slower speed of the tape drive may slow disk access time for the Ultra-160 SCSI drives. You may need to install a second SCSI controller board to control the backup tape drive separately from the Ultra-160 SCSI drives. You may use the internal SCSI cable provided with the second SCSI controller board to connect to the tape drive.

10. Replace the upper bezel and the left side cover.

11. Replace the external cables, power cord, and then restore power to the Server.

    The SCSISelect Utility automatically detects the new SCSI backup tape drive, but you should check the SCSISelect settings and make changes as necessary.

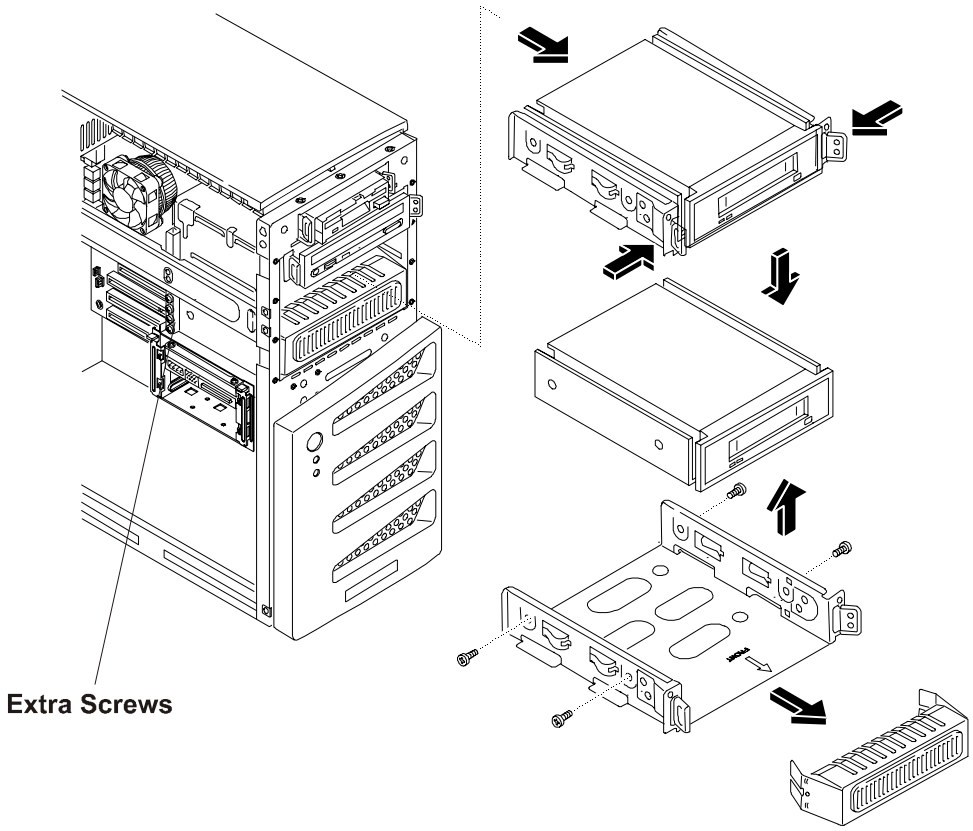


Figure 3-11. Installing the Optional Backup Tape Drive

Memory Modules

The main memory for the HP Tower Server tc2110 is implemented using three memory slots on the system board and it supports up to 1.5 GB (512 MB x 3) of memory. The Server only supports HP 168-pin, PC 133 (133 MHz), 3.3V, unbuffered, ECC SDRAM DIMMs and ships with at least one 128 MB DIMM installed.

NOTE	Use only memory modules provided for your HP Server model. The use of other memory modules is not supported. Install only 128 MB, 256 MB, or 512 MB unbuffered ECC SDRAM modules.

To ensure you have the correct DIMMs before installation, refer to one of the following for a list of qualified DIMMs:

- HP Order Assistant on the HP web site at:

  http://www.hp.com/

- HP Customer Service

Tools Required

Use an anti-static service kit (3M 8501/8502/8503 or equivalent). This kit includes a static-dissipating work surface, a chassis clip lead, and a wrist strap.

Memory Installation Guidelines

The HP Server tc2110 uses PC 133 (133 MHz) unbuffered ECC SDRAM DIMMs, which are electrically different from the EDO and PC100 SDRAM memory modules used in previous HP Server models.

- DIMMs sizes supported are 128 MB, 256 MB, or 512 MB in any combination.

- Supported memory capacity ranges from 128 MB to 1.5 GB maximum (512 MB x 3 DIMM slots total). The minimum capacity is 128 MB (one DIMM).
- DIMM sizes may be mixed on the system board and may be loaded in any order (1 through 3).

  However, HP recommends starting at slot 1 and filling the slots in order with the largest size first: 1, 2, and 3.
- Open slots between DIMMs are permitted.
- When handling DIMMs, observe anti-static precautions to avoid damage.

Installing Additional DIMMs

1. If the system is already installed and working, power off the system.

   Refer to Chapter 1, “Controls and Indicators.”
2. Disconnect the power cables and any external cables connected to the system.

   If necessary, label each one to expedite re-assembly.
3. Remove the side cover and lay it aside.

   Refer to “Opening and Closing the HP Server” earlier in this chapter.

WARNING	The power supply will continue to provide standby current to the Server tc2110 until the power cable is disconnected.

4. Lay the Server on its side (components showing) for the best access to the DIMM slots.

CAUTION	The memory modules (DIMMs) are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling the accessory kit: Leave the memory module in the anti-static container until you are ready to install it. Always use an anti-static wrist strap and a grounding mat. Before you remove a memory module from the anti-static container, touch a grounded, unpainted metal surface on the HP Server to discharge static electricity.

5. Locate the DIMM slots and select a DIMM slot for installation.
   See Figure 3-12.

   DIMMs may be installed in any combination, in any slot, but HP recommends starting at slot 1 and filling the slots in order with the largest size first in slots, 1, 2, and 3.

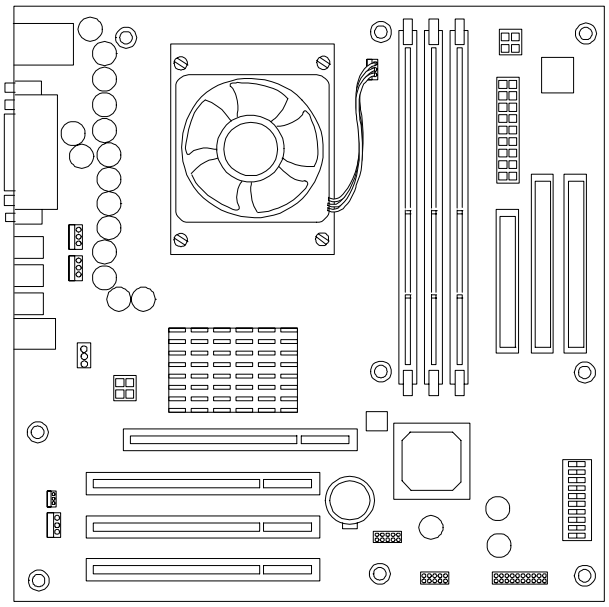


Figure 3-12. DIMM Locations on System Board

6. Remove the new DIMM from its container, handling the module by its edges.

   Use only HP PC133 (133 MHz) unbuffered ECC SDRAM DIMMs.

CAUTION	The DIMM should be left in the anti-static container or placed on an anti-static surface, until you are ready to install it into the DIMM slot.

7. Spread the two retaining latches on the slot and align the notches on the DIMM with the keys on the slot. See Figure 3-13.

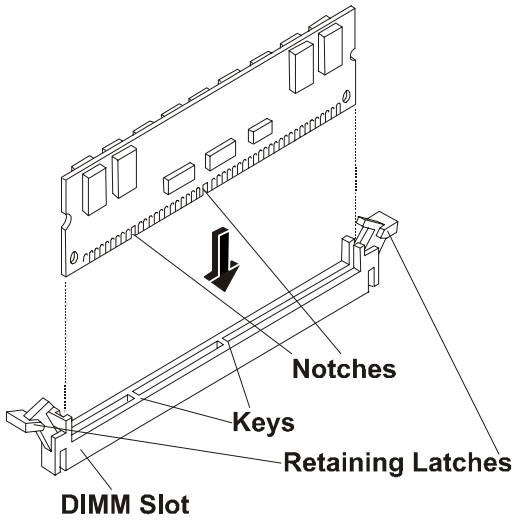


Figure 3-13. DIMM to Slot Alignment

8. Holding the DIMM at 90 degrees to the system board, press the DIMM fully into the slot until the retaining latches close. See Figure 3-14.

   If the latches do not close, the DIMM is not inserted correctly.

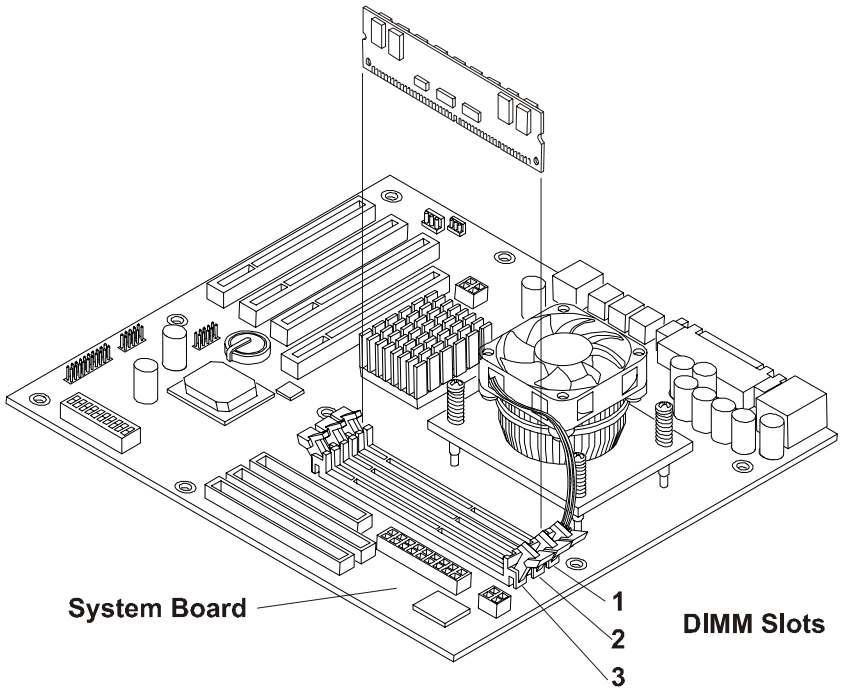


Figure 3-14. DIMM Insertion

9. Repeat Steps 7-8 to install the remaining DIMMs of your memory configuration.

Removing DIMMs

You may need to remove a DIMM module to downsize your memory configuration or to replace a defective DIMM.

1. If the Server is already installed and working, power down the Server.

   Refer to Chapter 1, "Controls and Indicators."

2. Disconnect the power cables and all external cables.

   If necessary, label each one to support re-assembly.

WARNING	The power supply will continue to provide standby current to the Server until the power cable is disconnected.

3. Remove the left side cover from the Server and lay it aside.

   Refer to "Opening and Closing the HP Server" earlier in this chapter.

4. Lay the Server on its side with the components up.
5. Open the retaining latches.
6. Lift the DIMM completely away from the slot.
7. Place the DIMM in its anti-static container.
8. Repeat Steps 5-7 for as many DIMMs as you need to remove.
9. When you have completed removal and installation of DIMMs as required, close the Server and restore power.

Processor

The procedures listed here for removing and replacing a processor and its heat sink-cooling fan are the same for all of the processors used in this HP Server.

CAUTION	Wear a wrist-strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure the metal of the wrist-strap contacts your skin.

Removing the Heat Sink and Cooling Fan

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.

2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

WARNING	The power supply will continue to provide standby current to the HP Server until the power cord is disconnected from the AC power source.

3. Remove the left side cover.
4. Lay the Server on its side (components showing).
5. Disconnect the cooling fan power cable from the connector on the system board.
6. Remove the screws securing the heat sink-cooling fan. Remove the heat sink by twisting and lifting it.

NOTE	The heat sink on your HP Server tc2110 may look different than the one shown in the illustration. If the heat is secured with thumb latches, press to unhook the thumb latch, then lift the heat sink and release the hook latch.

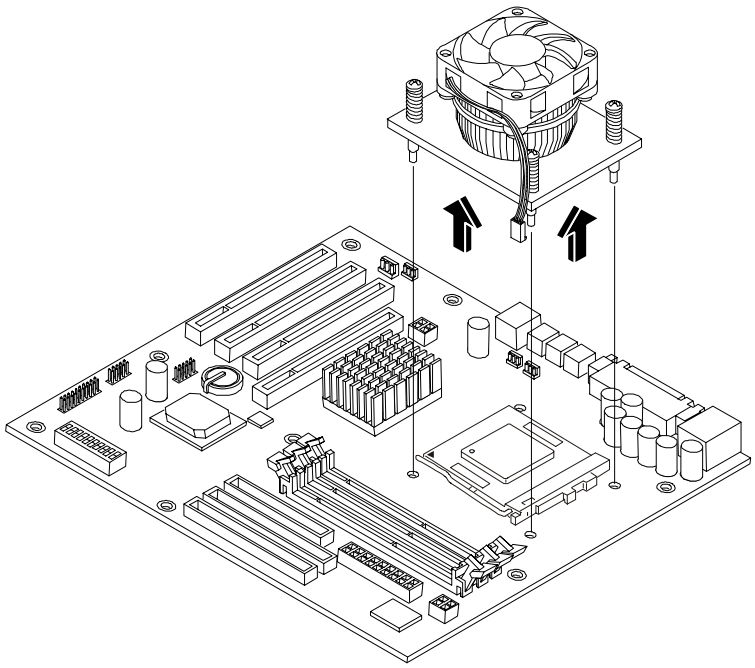


Figure 3-15. Removing Heat Sink and Cooling Fan

7. If the processor is stuck to the heat sink, carefully remove the processor from the heat sink, using a flat tool such as a screwdriver.

Removing the Processor

1. If you have not removed the heat sink-cooling fan assembly, do so now before continuing.

CAUTION	Wear a wrist-strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure the metal of the wrist-strap contacts your skin

2. Open the ZIF (Zero Insertion Force) lever completely to allow removal of the processor.

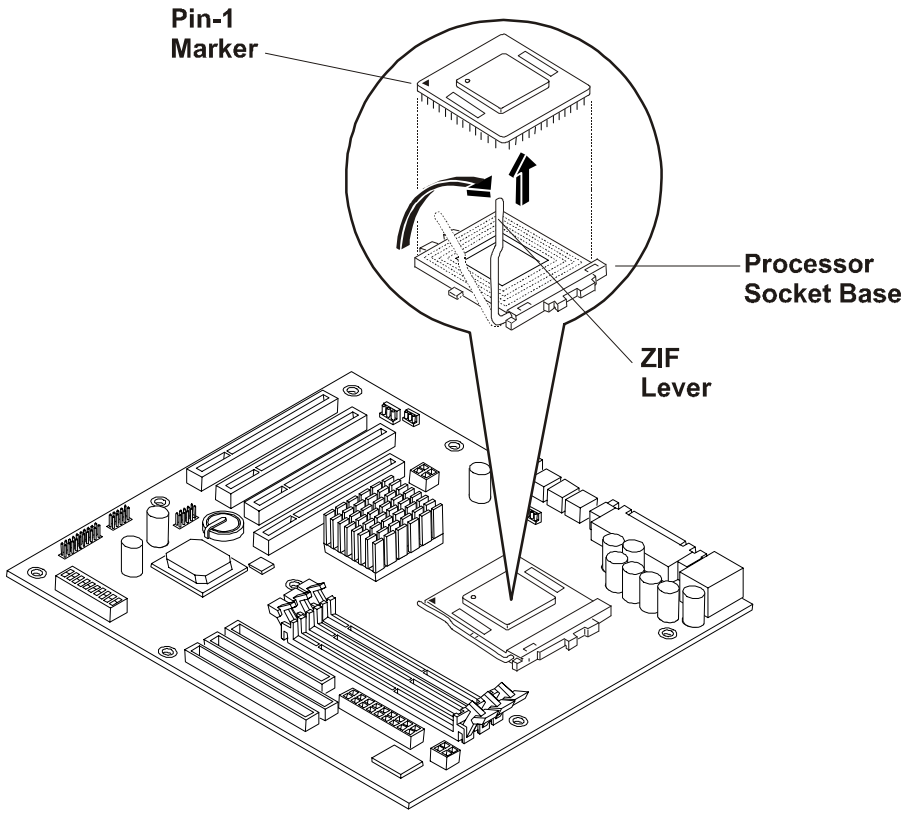


Figure 3-16. Removing the Processor

3. Grasp the processor by its edges and lift it out of the processor socket.
4. Place the processor on a static-dissipating work surface or into an anti-static bag.

Replacing the Processor

1. Locate the pin-1 marker on the processor before installing the processor.
2. Open the ZIF lever to allow access to the processor socket.

   Pull the ZIP lever up and away from the ZIF socket and then raise it to a full 90° to the system board.
3. Align the processor over the empty processor socket.

   The socket has a mark for pin-1 that should match the mark for pin-1 on the processor near the end of the ZIF lever.

CAUTION	Ensure that you align pin-1 of the processor with pin-1 of the processor socket or pin damage will occur.

4. Insert the processor into the socket and close the ZIF lever to fully seat the processor.

   You should hear the ZIF lever click when it closes properly.

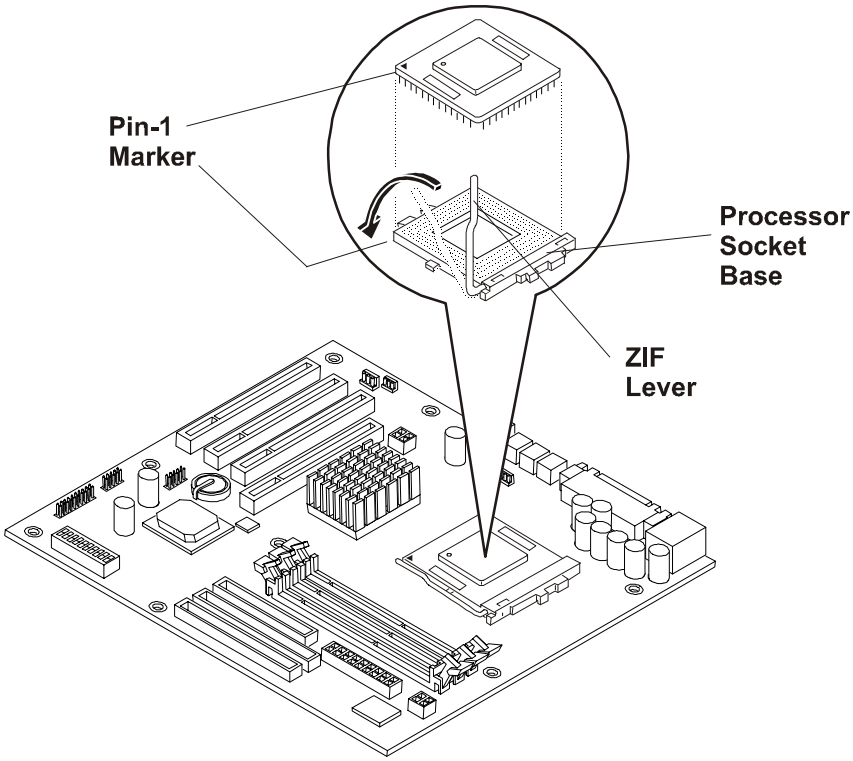


Figure 3-17. Replacing the Processor

Replacing the Heat Sink and Cooling Fan

Once the processor is installed, the heat sink-cooling fan must be installed on top of the processor. The thermal interface material on the bottom of the heat sink provides thermal bonding between the heat sink and processor. If you want to re-use the old heat sink, you need to remove the old thermal interface material from the heat sink and replace it. (A new heat sink comes with the thermal interface material pre-applied.)

1. Follow these instructions if you plan to replace the old heat sink on the processor:
   a. Carefully remove all old thermal interface material from the underside of the heat sink by scraping it off with a straight plastic edge, such as a plastic rule.
   b. If your heat sink kit has a thermal patch, affix the patch to the bottom of the heat sink.
   c. If your heat sink kit provides grease as the thermal bonding material, squeeze the entire contents of the tube on the processor.
2. If you are installing a new heat sink, if necessary, remove any protective covering from the patch on the bottom of the heat sink. If the heat sink uses grease as the thermal interface material, squeeze the entire contents of the tube on the processor.
3. Attach the heat sink to the processor.
4. Secure the heat sink using the springs and screws or thumb latches, depending on your heat sink model. If your heat sink uses thumb latches, hold the heat sink in place and press down firmly on the latches.

NOTE The heat sink on your HP Server tc2110 may look different than the one shown in the illustration and secure with thumb latches instead of screws.

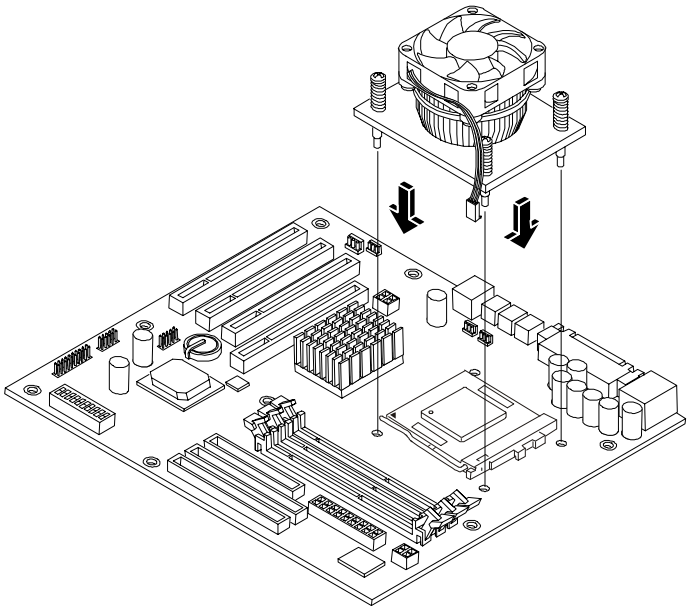


Figure 3-18. Replacing Heat Sink and Cooling Fan

5. Connect the cooling fan power cable to the fan connector on the system board.

CAUTION	Ensure that you connect the fan to the correct system board connector. If necessary, see "System Board Layout" in Chapter 9, "Specifications."

6. Replace the left side cover.
7. Replace the external cables and power cord.
8. Power on the Server as described in Chapter 1, "Controls and Indicators."

   The BIOS automatically recognizes the new processor. Ensure that the latest version of BIOS is installed. To learn which version of BIOS is currently installed, press F2 during startup, and then select Summary from the list of options. To get the latest BIOS version for the HP Server tc2110, connect to HP's support web site.

   http://www.hp.com/

Accessory Boards

The system board in the HP Tower Server tc2110 provides one AGP video card (installed) and three PCI slots (P1 through P3), 32-bits at 33 MHz bus speed. Some PCI slots may come with pre-installed boards. The SCSI model requires the first slot, (P1) for the SCSI controller board.

Tested PCI Boards

For a list of tested PCI boards, check for compatibility in the Hardware Tested Products list for the HP Server tc2110 under the Technical Support topic for the specific NOS used in the Server at HP's web site:

http://www.hp.com/

CAUTION	Some accessory board outputs may exceed U.S. National Electrical code (NFPA 70) Class 2 or limited power source limits and must use appropriate interconnecting cabling in accordance with the National Electrical Code.

NOTE	All Hewlett-Packard accessory boards comply with the U.S. National Electrical code (NFPA 70) Class 2.

Tools Required

These tools may be needed for preparing the accessory boards for installation in the Server:

- Torx T-15 screwdriver
- ¼-inch flat blade screwdriver
- An anti-static service kit (3M 8501/8502/8503 or equivalent). This kit includes a static-dissipating work surface, a chassis clip lead, and a wrist strap.

Guidelines

The following sections provide the guidelines necessary to install the PCI accessory boards into the Server.

NOTE	Some full-length PCI boards may need a plastic "handle" (board extension) on one end to stabilize the board in the Server. If the board requires one and it is not installed, you may need to install the handle on the board, before installing it in the HP Server. See Figure 3-23.

IRQ Settings

The IRQ settings are automatically assigned and do not require user intervention. The HP Server uses the Plug-and-Play feature of the PCI boards to correctly assign its resources automatically.

Boot Priority

The Server's boot priority (BIOS search order for a boot drive) should be considered when selecting a PCI slot on the system board. This is especially important if you are installing a board that requires an early number in the boot order. The accessory board's boot priority is set by its slot location in the boot order. See Figure 3-19.

If the single SCSI controller board is used to control internal SCSI drives (SCSI model), it will be early in the boot order. The single SCSI controller board has two SCSI connectors, but only one SCSI connector can be active at a time. The Server scans the active SCSI connector for a boot device starting at device ID 0 and works up from there.

By default the Server searches for boot devices in the following order depending on the Server model:

IDE Model Boot Order:

1. Flexible disk drive
2. IDE CD-ROM drive
3. IDE hard drive (boot drive)
4. PCI slot P1 (32-bit slot)
5. PCI slot P2 (32-bit slot)
6. PCI slot P3 (32-bit slot)

SCSI Model Boot Order:

1. Flexible disk drive
2. IDE CD-ROM drive
3. IDE hard drive (if boot drive)
4. SCSI devices
5. PCI slot P1 (32-bit slot)
6. PCI slot P2 (32-bit slot)
7. PCI slot P3 (32-bit slot)

NOTE The boot order can be changed by pressing F8 during the POST, or by using the Server's (BIOS) Setup Utility. For more information, refer to "BIOS Setup Utility" later in this chapter. You may also activate the Network Boot by pressing F12 during the POST.

Installing an Accessory Board

Use this procedure to install accessory boards and observe the installation guidelines listed earlier.

1. If the Server is already installed and working, power down the Server.

   Refer to Chapter 1, "Controls and Indicators."

2. Disconnect the power cables and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the side cover and lay it aside.

   Refer to "Opening and Closing the HP Server" earlier in this chapter.

WARNING The power supply will continue to provide standby current to the Server until the power cable is disconnected.

CAUTION Wear a wrist-strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure the metal of the wrist-strap contacts your skin.

4. Lay the Server on its side (components showing) for the best access to the accessory board slots.
5. Read the documentation included with the accessory board and follow any special instructions.
6. Identify the accessory slot number to be used. See Figure 3-19.

   The SCSI model should already have the SCSI controller board installed in PCI slot P1.

NOTE Refer also to "System Board Layout" in Chapter 9, "Specifications" for connections not shown in Figure 3-19.

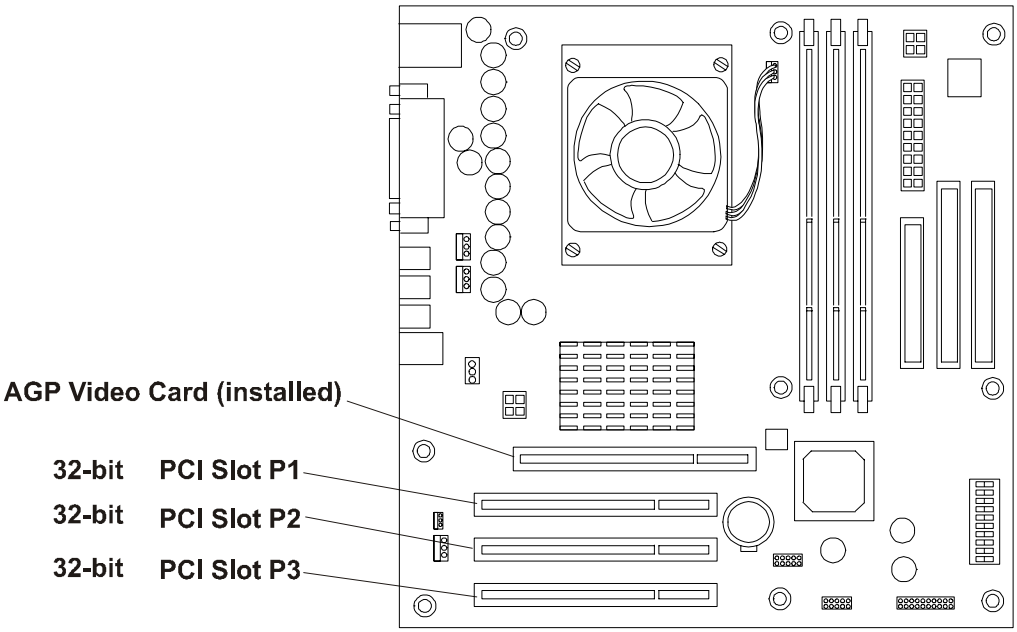


Figure 3-19. Accessory Board Slots

NOTE Refer to the Tested Products List on the HP web site for specific slot recommendations for a particular accessory board type.

7. Remove the slot cover latch:
   a. Lift up on the tab of slot cover latch.
   b. Raise the slot cover latch up from the slot covers.
   c. Remove it from the chassis and keep it for reassembly. See Figures 3-20 and 3-21.

   You may need to lift the slot cover latch out of its retainer before lifting it out of the chassis.

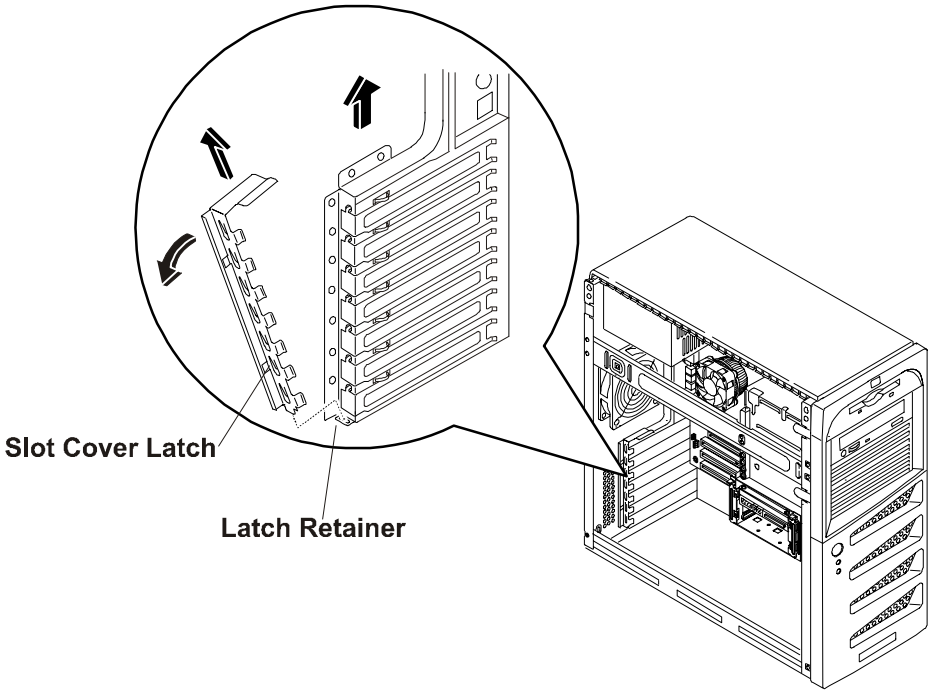


Figure 3-20. Removing the Slot Cover Latch

8. Move the top of the desired slot cover away from the chassis and then lift it up and out of the chassis. See Figure 3-21.

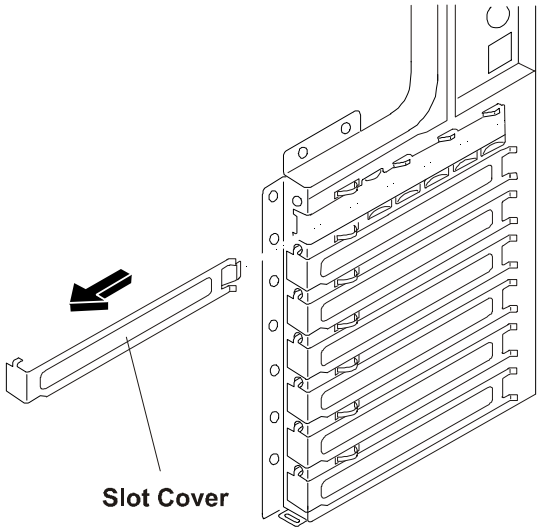


Figure 3-21. Removing the Slot Cover

NOTE Ensure that you save the slot covers for use later to prevent EMI interference.

9. If you are installing an AGP card, open the latch located at the side of the slot.
10. Align the card carefully, slide it into position, and press it firmly into the slot. See Figure 3-22.

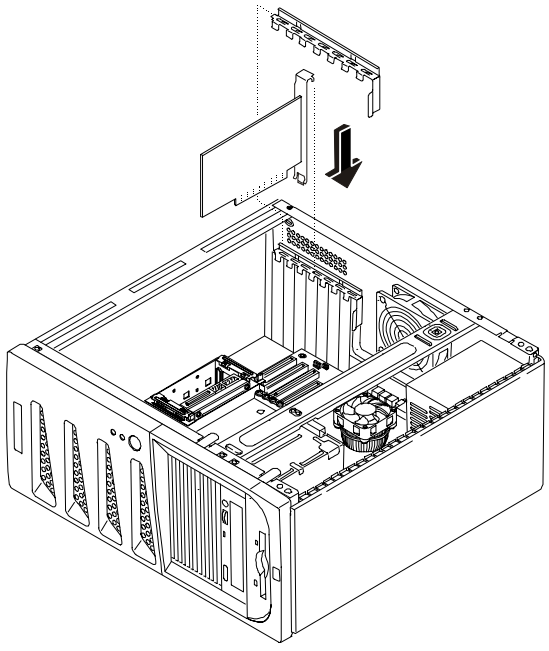


Figure 3-22. Inserting an Accessory Board

11. If you are installing an AGP card, close the latch located at the side of the slot.
12. Replace the slot cover latch to secure the accessory board in the reverse order shown in Figure 3-20.

    The slot cover latch should snap in place.

NOTE You may need a plastic extension to secure any full-length boards in PCI slots P1 through P5. See Figure 3-23.

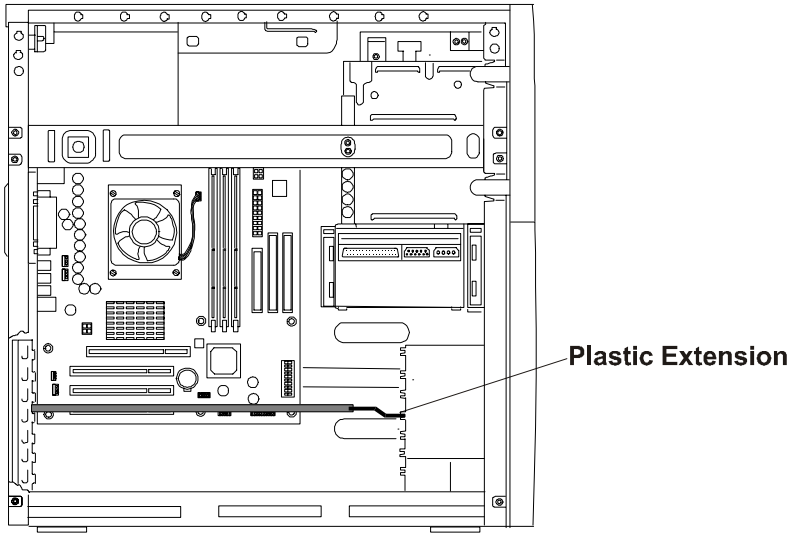


Figure 3-23. PCI Board Plastic Extension

13. Once the accessory board is installed, you may need to install software drivers.

    The drivers for the new board are either part of your existing system software or included on a flexible diskette or CD-ROM provided with the accessory board.

Removing Accessory Boards

Apply the same steps as the installation procedure in reverse. Replace the slot cover. See the preceding sections for details.

NOTE Ensure that you use a slot cover to seal the unused board slot to prevent EMI interference. These slot covers make a better metal-to-metal contact than previous slot cover designs.

Connecting Peripheral Devices

This section contains instructions for connecting the peripheral control devices, including the UPS and monitor, to the HP Server tc2110.

NOTE The two USB connectors are reserved for printers, external modems, a keyboard and a mouse, but support for these USB devices is NOS dependent.

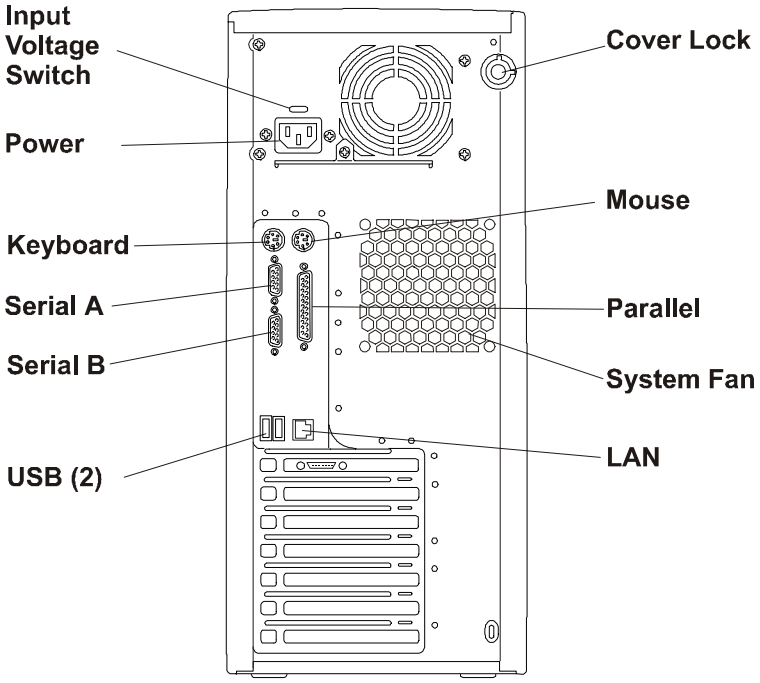


Figure 3-24. Rear Panel Ports

Monitor, Keyboard, and Mouse

1. Place the monitor, keyboard, and mouse near the HP Server and connect these devices to the Server using the connections provided on the rear of the chassis. See Figure 3-24.

   The connectors are color-coded for easy matching.

NOTE	If you have a console switch box, refer to the switch box's user guide for instructions on connecting the keyboard, mouse, and monitor.

CAUTION	The keyboard and mouse ports are both PS/2 ports, but are not interchangeable. If you plug the keyboard into the mouse port, or the mouse into the keyboard port, you will get an error message and the system will not finish the boot process.

2. If a LAN cable is provided, you may connect it now, or wait until you have verified the Server's operation.

CAUTION	To prevent possible damage to the HP Server's power supply, set the input voltage selector to the correct input voltage.

3. Check the input voltage selector to ensure that you have the correct input voltage selected.

Uninterruptible Power Supply (UPS)

If you do not use a UPS with the Server, you may experience an arching effect when you plug in the power cord to the AC power source. This is normal, due to the high inrush current of the power supply.

1. Place the UPS (Uninterruptible Power Supply) near the HP Server to connect the two devices.
2. Connect the serial cable and power cord provided between the UPS and the HP Server.

   Refer to the user guide included with the UPS for additional information.
3. If you have connected the serial cable and power cord between the two devices, turn on the UPS.

The HP Server tc2110 performs a diagnostic test when the power switch is turned on. If an error condition occurs, note any error code appearing on the display, then refer to Chapter 6, "Troubleshooting."

Configuring the HP Server tc2110

The following sections describe how to configure the HP Server tc2110 with the help of the *HP Startup CD-ROM*, (BIOS) Setup Utility, and SCSISelect Utility. The (BIOS) Setup Utility and SCSISelect Utility automatically detect most of the hardware devices you install, but you should verify that the Server has properly recognized the options after you have installed all of the optional accessories.

Use the following resources to configure the Server:

- *HP Startup CD-ROM* – This CD-ROM allows you to access and copy the needed utilities and drivers to flexible diskettes, which can used to configure the Server. Some NOS drivers are copied directly to the Server from the Startup CD.
- NOS Drivers - The NOS drivers are copied from the Startup CD-ROM to diskettes. Refer to the instructions in the *HP Server tc2110 NOS Installation Guide*.
- HP Diagtools Utility – The HP Diagtools DOS utility can be run from the Startup CD-ROM by booting the Startup CD in the Server. The HP Diagtools Utility provides an easy-to-use hardware diagnostic for:
  - Server verification
  - Rapid troubleshooting
- (BIOS) Setup Utility - This firmware utility is used to configure the following Server options:
  - BIOS settings
  - HP Server Date and Time
  - Setting the HP Server's Boot Passwords
  - Setting Internal Device Boot Priority
  - Clearing Boot Passwords (CMOS)
- SCSISelect Utility - This utility is used to:
  - Verify or modify SCSI controller settings.
  - Low-level format the SCSI disks or verify the SCSI disk media, if necessary

  The SCSI configuration utility used for the HP Server tc2110 is the Adaptec SCSISelect Utility.

HP Startup CD-ROM

The *HP Startup CD-ROM* provides you with the latest NOS drivers, Diagtools Utility, BIOS Flash utility, and a utility for creating diskettes.

- Run the *HP Startup CD-ROM* on any Windows PC with an HTML browser to obtain the required NOS drivers and the BIOS Flash utility located on the CD-ROM.
- Refer to the *HP Server tc2110 NOS Installation Guide,* when installing the NOS drivers on the Server for more information about the using the *HP Startup CD-ROM*.

  Refer to the topic NOS Installation on the next few pages, for more information.

Accessing the HP Startup CD-ROM

The *HP Startup CD-ROM* is accessed using two methods, which is based on where you are in the installation and verification process.

- Windows method – This method allows you to run the *HP Startup CD-ROM* on any Windows PC with an HTML browser to access the contents of the *HP Startup CD-ROM*. The CD-ROM should auto-start, but if it does not, start it by opening the Startup.htm file found at the root level of the Startup CD.

To use the Startup CD-ROM on a Windows PC, you must have an HTML browser tool (like Microsoft Internet Explorer 4.x, or Netscape Navigator version 4.x or greater) to view the HTML format.

- DOS Boot method - This method allows you to boot the *HP Startup CD-ROM* as a bootable CD-ROM and launch HP Diagtools Utility directly from the CD-ROM in DOS.

NOTE The NetWare NOS installation contains a known software error (not product-specific) that does not allow you to boot from CD-ROM. To work around this problem, boot from a DOS diskette and create a bootable DOS partition on the drive.

Contents of the HP Startup CD-ROM

The *HP Startup CD-ROM* contains the following drivers and utilities:

- NOS Drivers (IDE, SCSI, NIC, Video) for all supported NOSs on the HP Server tc2110 (IDE and SCSI models).
- Diagtools Utility
- BIOS Flash Utility

NOS Installation

The instructions for manually installing your specific network operating system (NOS) and the respective NOS drivers are provided in the *HP Server tc2110 NOS Installation Guide*. The *HP Server tc2110 NOS Installation Guide* will help you when creating and copying the appropriate drivers (NOS, IDE, SCSI, NIC, and Video) onto the required diskettes. In some cases you will use the diskettes to load the appropriate drivers onto the Server, or load the drivers directly from the *HP Startup CD-ROM* onto the Server. Refer to the Welcome menu on the *HP Startup CD-ROM*.

Diagtools

This utility provides an easy-to-use hardware diagnostic for Server verification, burn-in, and rapid troubleshooting. It is launched from the CD-ROM when the *HP Startup CD-ROM* is used to boot the server in DOS.

NOTE HP recommends using the HP Diagtools Utility to verify all Server functions are operating correctly, after completing all the configuration topics. The HP Diagtools Utility also generates a text file containing the hardware detected and the Diagtools test results. This text file, called a support ticket, should be saved to a diskette and used for future reference, especially by your support provider.

The HP Diagtools Utility will start automatically when the *HP Startup CD-ROM* is booted in the HP Server in DOS.

BIOS Setup Utility

Use the BIOS Setup Utility to configure items in the BIOS using the following menus:

- Main
- Advanced
- Security
- Boot
- Power
- Exit

Accessing the Setup Utility

1. Turn on the monitor and the HP Server. If the HP Server is already turned on, save your data and exit all programs, then restart the server.
2. Press F2 while the startup-logo is displayed at the bottom of the screen.

   If you fail to press F2 in time and the startup process continues, you will need to restart the HP Server so that you can press F2.

Viewing the Summary Configuration Screen

The Summary Screen provides information about the current Server configuration, including the BIOS version, CPU speed, memory module size, and installed mass storage devices. You should check the Server configuration when you first set it up and each time you install, remove, or upgrade accessories.

To check the configuration:

1. Turn on the monitor and the HP Server. If the HP Server is already turned on, save your data and exit all programs, then restart the server.
2. Press the Esc key while the start-up logo is displayed.
   The Summary Screen displays briefly. Press the Pause/Break key on the keyboard to continue displaying the Summary Screen until another key is pressed.

Menu Bar

The Setup Utility provides a menu bar with several menu selections. The menu bar choices are:

- Main - Use this menu option to set the following features:
  - BIOS version – Indicates the installed BIOS version.
  - Reset Configuration Data – Select Yes to clear the system configuration data and return to the default settings.
  - System Time – Set the system time.
  - System Date – Set the system date.
  - Key Click – Enable or disable the sound when keyboard keys are struck.
  - Keyboard Auto-repeat Speed – Set the repeat rate for keyboard keys.
  - Delay Before Auto-repeat – Set the delay time before a keyboard key auto-repeats.
  - NumLock at Power-on – Set the NumLock key on or off when Server is powered-on.
- Advanced – Use this menu option to configure memory caching, USB ports and integrated I/O ports, and enable floppy disk drives and IDE devices.
  - Processors, Memory and Cache – Indicates the processor type and CPU speed. Use to enable or disable memory caching and memory error checking (for ECC modules only).
  - Floppy Disk Drives – Enable or disable the flexible disk drive controller.
  - IDE devices – Set primary master/slave, secondary master/slave relationships on IDE devices and enable/disable the IDE controller. Set the delay time during POST before hard disk drives are initialized. A delay time may be required for slow hard disk drives to come up to speed.
  - Integrated USB Interface – Enable/disable the USB interface.
  - Integrated I/O Ports – Configure ports for serial and parallel, assign base addresses and interrupts.
  - Integrated Audio Device– Enable/disable integrated audio device.
  - AGP Configuration (Video) – Indicates the graphic aperture.
  - PCI Device Slot #1, #2, and #3 – Configure the PCI slots individually.
- Security – Use this menu option to set BIOS access, boot on password protections and hardware security options. Two levels of BIOS access (Administrator and User) are available.

  - Administrator Password – The Administrator can access and change all settings in the Setup program.
  - User Password– The User can only access and modify certain items in the Main menu.
  - Power-on Password – If enabled, a password (User or Administrator) is required to enter the Setup Utility or complete the boot process.
  - Device Start Protection – Enable or disable unauthorized startup from network, flexible disk, CD-ROM, IDE hard disk drive, or USB device.
  - Hardware Protection – Sets security for various hardware components.
- Boot – Use this menu option to set the boot order of the mass storage devices.
  - Quickboot Mode – If enabled, allows the system to skip certain tests while booting, which decreases the time needed to boot the Server.
  - Primary Video Adapter
  - Boot Device Priority
- Power – Use this menu to set the power-saving options (they are NOS dependant). This menu enables ACPI features only available with certain NOSs.
  - Remote Power On – Enable or disable remote power on feature of the integrated network controller or other devices supporting WOL (Wake-On-LAN).
  - After Power Failure – Sets the mode of operation after an AC power failure. “Power On” turns the server back on. “Power Off” leaves the server powered off. “Last State” restores the state of the server before the power failure.
  - Boot on LAN after RPO – Enable or disable boot on LAN when the server is powered on remotely (Remote Power On).
  - OPROM Display Mode – Select “Force BIOS” to display details of POST progress.
- Exit – Use Exit menu in the Setup Utility to save changes, discard changes, or load the setup defaults.

Using the Setup Screens

Online help explains the settings displayed on the Setup Utility screens. Instructions are also provided for navigating between the screens and entering or changing the setup data.

- Press the right-arrow and left-arrow keys to move between selections on the menu bar. The menu bar is present at the top of the main selections.
- Press the up-arrow and down-arrow keys to move between fields on each screen. The currently selected field will be highlighted.
- Certain fields ask you to choose from a list of entries. In such cases, press the plus (+) or minus (-) keys repeatedly to display each possible entry, or the Enter (or Return) key to choose from a pop-up menu.
- Small arrow pointers (➢) precede some field names. This means the field is actually a submenu. To visit the submenu, select it with the arrow keys and press the Enter key. The submenu then appears in place of the current screen.
- The Esc key is the exit key. If you press the Esc key on one of the top-level screens, the Exit menu appears. If you press Esc on a submenu, the previous screen appears. When you are making selections from a pop-up menu, use the Esc key to close the pop-up without making a selection.

Changing the System Date and Time

Follow these steps to change the HP Server’s date and time:

1. To reach the (BIOS) Setup Utility, boot or reboot the system and press F2 when prompted.
2. If necessary, use the left-arrow key to select Main from the menu bar at the top of the screen.

Once in the Setup Utility, the menu bar appears at the top of the screen. The menu choices are Main, Advanced, Security, Boot, Power, and Exit. The Main menu is the default menu and should be the highlighted selection at the left of the menu bar when the Setup Utility first opens.

3. If necessary, use the up-arrow key to move to the System Time field.

   The System Time field actually consists of three sub-fields enclosed in brackets [xx:xx:xx]: Hour to the left (24-hour clock), minutes in the middle, and seconds to the right.

4. Type in the value for Hour and press Enter to move to the minute field.
5. Type in the value for Minutes and press Enter to move to the second field.
6. Type in the value for Seconds and press Enter.

   The cursor moves back to the Hour sub-field.

7. Scroll to System Date field to enter the system date in the field.

   Enter the dates in the "System Date" field in the same way you entered the time in the "System Time" field. The System Date field has three separate sub-fields for month, day, and year enclosed in brackets [xx/xx/xxxx].

8. Type in the value for Month and press Enter to move to the day field.
9. Then type in the value for Day and press Enter to move to the year field.
10. Type in the value for Year, using all four digits, and press Enter.

    The cursor moves back to the Month sub-field.

11. Use the right-arrow key to select the Exit menu.
12. Choose Exit Saving Changes from the list of exit options, then press Enter.

    A dialog box appears and asks you to confirm your decision.

13. Choose Yes and then press Enter.

    The HP Server reboots and the date and time changes have been accepted.

Setting Boot Passwords

Use the Security menu in the BIOS Setup Utility to set passwords to provide different levels of protection for the HP Server. You can set three types of passwords: Administrator password, User password and Power-on password. The Administrator can access and change all settings in the Setup program, while the User can only access and modify certain items in the Main menu. When the Power-on Password option is enabled, you need to enter a password every time you boot the workstation. Either the Administrator or User Password can be used.

To set a password:

1. Start the Setup program.
2. Select the Security menu.
3. Select the Administrator or User password submenu.
4. Choose the Set Administrator or User Password setup item. You must enter your password twice.
5. To enable the Power-on Password, select the Enabled setup item.
6. Press Esc or select Exit Menu, then Exit Saving Changes to save your changes and exit the Setup program.

To remove the password:

1. Follow the same procedure as to set a password.
2. Enter the existing password when prompted.
3. For the new password, leave the field blank and press Enter.
4. Press Enter again to confirm your choice.

SCSI Configuration Utility

The HP Server uses the SCSISelect Utility to verify or modify the SCSI controller board settings for the devices connected to the active SCSI connector on the SCSI controller board. If you need to verify or modify SCSI controller settings, or if you need to low-level format SCSI disks or verify SCSI disk media, run the SCSISelect Utility.

NOTE	You typically would not need to use this utility unless you are an experienced administrator or have been requested to do so by a support provider.

During the boot process the BIOS searches for SCSI devices and a specific message appears if there are devices connected to the SCSI controller board, as shown below. The SCSI controller can provide the bus, device, and channel configurations when active on screen.

To access the SCSISelect Utility, refer to the following instructions.

1. Boot or reboot the HP Server.

   If you are already in the boot process, you should see the following message appear.

   ```
   <<<Press <Ctrl A> for SCSISelect™ Utility!>>>
   ```

2. Press Ctrl + A to enter the utility.

   The SCSISelect Utility appears on screen.

3. Use the arrow keys to move the cursor, press Enter to select an option, or press Esc to exit.
4. To change SCSI controller settings, select “Configure/View Host Adapter Settings.”

   This menu allows you to configure the SCSI controller ID settings or other advance controller settings.

5. Select “SCSI Disk Utilities” to format a hard disk or change hard disk parameters:

CAUTION	Low-level formatting of a SCSI disk drive will destroy all of its data.

4 Diagnostics

When the Server boots, a series of tests are displayed on the screen. The number of tests displayed depends on the configuration of the Server. The following are the types of errors a user might get with the HP Server.

- Built-in diagnostic error messages.
- BIOS and other error messages. These are errors detected by the system BIOS outside the built-in diagnostics or application errors.

To see the Power On Self-Tests (POST):

- The HP Server must be functionally able to run the diagnostics.
- The video system must be functional.
- The keyboard must be functional.

NOTE	The BIOS ROM version number is displayed on the monitor screen during power-up.

WARNING	You should always turn off the power and disconnect the power cord to the Server before attempting to remove the cover and touch the internal components. Failing to do so can expose you to electric shock and the Server's components to damage. The power switch does NOT turn off standby power, so disconnect the power cord to turn off standby power.

Power-On Self Test (POST)

The diagnostics (Power-On Self-Test "POST") run automatically each time the Server is powered on. These diagnostics, which reside in the BIOS ROM, isolate server-related logic failures and indicate the board or component that needs to be replaced, as indicated by the error messages. Most Server hardware failures will be accurately isolated by the diagnostics.

There are two types of error messages:

- **Power-on self-test (POST) messages** – These text messages display in normal video (white text on black background). If a text message error occurs during the POST, details of the error are displayed. Follow the instructions on the screen. Samples of these messages appear in Table 4-1.
- **Beep Codes** – These are a series of audible beeps, which occur during the boot process before the video display can initialize allowing the visual messages of the POST routines to appear. If you hear a series of audible beeps before the video appears on screen, refer to the beep codes listed in Chapter 5, "Error Messages."

No Error Messages Displayed

General Checks:

1. All external cables and power cables are firmly plugged in.
2. The power outlet is working.
3. The server and monitor are turned on. (The power-on indicator should be illuminated.)
4. The display's contrast and brightness settings are correct.
5. All internal cables are properly connected and all boards firmly seated.
6. Verify that the processor and its heat sink-fan are fully seated in its socket on the system board.
7. Verify that the Memory is installed correctly and fully seated.
8. Verify that the slots and tabs are aligned in the DIMM connector.

After Installing an Accessory:

1. Turn off the monitor, the server, and any external devices.
2. Unplug all cables from the power outlet.
3. Open the side panel.
4. Check the following:
   a. If you have installed an accessory board, verify that the board is firmly seated in its slot and any switches or jumpers on the accessory board are properly set.

      Refer to the documentation provided with the accessory board.
   b. Check all internal cabling and connections.
   c. If you have changed any switches on the system board, verify that each one is properly set.

NOTE Only two of the eight switches on the configuration switch are used.

5. Close the side panel and connect all cables.
6. Turn on the monitor and server.
7. If the server still does not work:
   a. Repeat steps 1, 2, and 3 of this section.
   b. Remove all accessories, except the primary boot hard disk drive.
   c. Close the side panel and connect all cables.
   d. Turn on the monitor and the server.
   e. If the server now works, replace the boards and accessories one at a time to determine which one is causing the problem.

POST Error Messages

If you get a POST text error message in reverse video, details of the error are provided on the screen. Recommendations for troubleshooting are sometimes displayed along with the error message or by pressing Enter.

If the server starts, but POST still reports an error message, clear the CMOS configuration, as described later in this chapter.

NOTE HP recommends you correct the error before proceeding, even if the server appears to start successfully.

Table 4-1 describes typical POST text errors and the corrective action you may take to remedy the problem.

Table 4-1. POST Error Messages

Message	Corrective Action
Operating system not found	• Verify that the desired boot drive has power and its SCSI cable is connected. • Verify that the SCSI cable is securely plugged into the SCSI connector on the system board. • Verify that the boot device is enabled in the Setup Utility under the Security menu. • Verify that the boot device has an operating system installed. If the problem persists, contact your HP support organization.
Keyboard error	Verify that the keyboard is connected to the correct connector (not the mouse connector) at the rear of the server. If the problem persists, replace the keyboard or contact your HP support organization.
Mouse error	Verify the mouse is connected to the correct connector (not the keyboard connector) at the rear of the server. If the problem persists, replace the mouse or contact your HP support organization.
If no message appears (screen is blank)	• If no text or messages appear, listen for the beep codes. Refer to the Service manual on the *HP Server Online Documentation CD-ROM.* • If no message appears but the server stops after POST, verify that the DIMMs are correctly installed.
If a configuration error occurs	If a server configuration error is reported during the startup routine, clear the CMOS memory as described in Chapter 6, "Troubleshooting" and restart the server.
System CMOS checksum bad	• Press F2 to run Setup. • Change settings as required. • Choose the Exit option, selecting Save Changes and Exit to save the new settings. The server should reboot.

Clearing the CMOS and Passwords

You may need to clear the BIOS configuration (CMOS) if the configuration has been corrupted, or if incorrect settings made in the Setup Utility have caused error messages to be unreadable.

1. Power down the Server.

   Refer to Chapter 1, "Controls and Indicators" for instructions.

2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the left side cover.

4. To clear the CMOS memory, set configuration switch 5 to the ON position.
   To clear passwords, set configuration switch 6 to the ON position.

   See Figures 4-1 and 4-2.

5. Replace the left side cover and reconnect only the power cord.

6. Power up the Server.

A message indicates that the configuration has been cleared.

7. Power down the Server and disconnect the power cord.
8. Remove the left side cover.
9. Set the CMOS/Password switch to the OFF position to retain the configuration.
10. Replace the left side cover and reconnect the power cord and all data cables.
11. Power up the server.
12. Run the Setup program by pressing F2.
13. Press F9.

    The CMOS default values are automatically downloaded and saved.
14. Press Esc to save the configuration and exit from the Setup program.

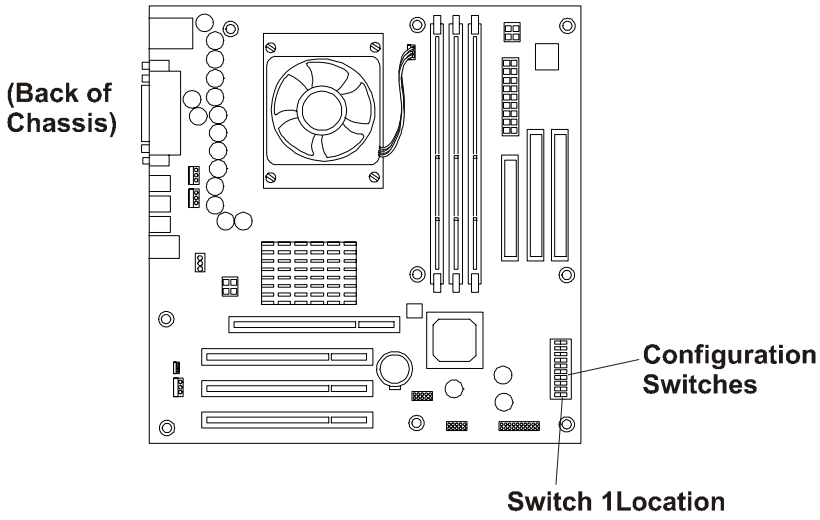


Figure 4-1. Location of Configuration Switches

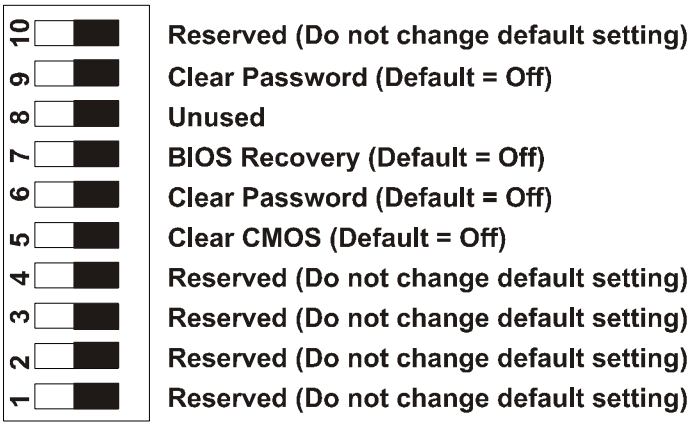

10 Reserved (Do not change default setting)
9 Clear Password (Default = Off)
8 Unused
7 BIOS Recovery (Default = Off)
6 Clear Password (Default = Off)
5 Clear CMOS (Default = Off)
4 Reserved (Do not change default setting)
3 Reserved (Do not change default setting)
2 Reserved (Do not change default setting)
1 Reserved (Do not change default setting)

Figure 4-2. Configuration Switch Positions

HP Server Diagtools

The purpose of hardware diagnostic software is to provide tools for checking hardware problems. By design, diagnostic software executes simple tests of each hardware component. Usually, such tests assure the hardware is not the source of Server problems. This allows the user to eliminate hardware as the cause of the problem and to focus on operating system configuration parameters, network connections, and application software configuration parameters as the source of the problem.

If hardware problems are confirmed, the diagnostic software program can sometimes detect and diagnose the system or specific Server component causing the problem. In addition, diagnostic tools can capture information that allows support personnel to quickly assess the condition of the Server.

In order to be effective, diagnostic software tools must be used in the context of a wider troubleshooting procedure.

HP Diagtools Capabilities

HP Diagtools for HP Servers is a set of off-line diagnostic tests, including tests for system and processor components, memory and storage elements, ports, and input/output devices. Diagtools is supplied on the *HP Startup CD-ROM*.

The HP Diagtools Utility is run from the Startup CD-ROM, which is a bootable CD-ROM when inserted into the CD-ROM drive and the Server is rebooted. A basic suite of tools checks key Server components, and a menu of advanced tests is available for in-depth testing.

Diagtools has the ability to test the following components:

- System board
- Memory modules
- Flexible disk drive (FDD)
- Parallel ports
- Video monitor
- Processor
- Hard disk drives (HDD)
- Keyboard
- CD-ROM drives

Diagtools is an off-line diagnostic. Off-line diagnostics do not use the main network operating system (NOS) of the HP Server. The alternate Diagtools OS has far fewer features than the full-fledged NOS. Thus, its capabilities are limited to a set of basic tests and a series of advanced tests. In addition, Diagtools does not use any tests that might write over and destroy user data. Tests that require user inputs or decisions are left to the advanced series of tests.

You can use Diagtools to perform the tasks listed below:

- Display a high-level inventory of the Server under test
- Save and print a detailed inventory of hardware components
- Conduct a basic test of components listed in the Server inventory
- Display “PASSED” or “FAILED” overall results of basic tests
- Record detailed test results of basic Server tests
- Display a menu of advanced tests
- Select and run one or a series of advanced tests
- Add the record of results of advanced tests to the record of basic tests
- View a list to locate the meaning of a specific error code
- View one or more steps to help confirm and isolate error conditions
- Browse the support ticket, which contains the detailed inventories and test results
- Add comments to the support ticket

About Error Messages

A hexadecimal number designates each error message reported by Diagtools; a short note on the type of error; and a list of one or more steps the user can take in response. When you run a test, it exercises many aspects of the hardware, so the number of possible error messages exceeds 300. Most of these are encountered rarely, if ever.

Error codes can be viewed on line from the Diagtools User menu within the advanced series of tests, or you can refer to Chapter 3 of the *HP Server Diagtools Error Reference and User Guide*.

Advantages and Limitations of Hardware Diagnostics

Off-line diagnostic software is useful in making sure the hardware has been eliminated as the cause for possible Server problems. Such diagnostic tools can easily be shipped with a server, and they are relatively easy to use.

Only experienced personnel knowledgeable of its limitations should use off-line diagnostic software.

Some limitations are:

- Booting the Server from the Startup CD-ROM
- No access to operating system error logs, since the OS is not operating at the same time as the diagnostic tools
- Limited ability to test only a single component at a time
- Inability to indicate problems with wrongly configured Servers or the network

HP Toptools

HP Toptools is the browser-based management software that provides remote administration and monitoring of critical server components. Toptools (with the server component) provides vital information for the fastest troubleshooting and proactive management of your HP Servers. Processors, memory, storage, and NICs are a few examples of the components managed by Toptools.

Toptools is included with every HP Server and should be installed to help your service provider troubleshoot your HP Server. Toptools is located on the *HP Toptools CD-ROM*.

You can also download the Toptools software and documentation from the Toptools Web Site at:

http://www.hp.com/

Some of the features of Toptools include:

- Notification of problems with key hardware components, including memory, disk drives, SCSI controllers, and NICs
- Unified event log to review a complete history of server activity in one place
- Predictive disk problem warning backed by HP's pre-failure warranty replacement
- Disk capacity threshold alert and usage tracking
- View of critical server inventory information, such as the BIOS version, driver and firmware versions, PCI slot contents, and serial and parallel ports
- Easy linkage with leading management platforms, including HP OpenView Network Node Manager and Computer Associates' Unicenter TNG and Tivoli products
- HP Toptools AutoAlert provides proactive warning of problems and advice on quick resolution through a friendly "traffic light" user interface
- Support for DMI 2.0, which provides the same Desktop Management Interface inventory information for servers as for desktop PCs

5 Error Messages

This chapter describes the POST error and beep codes that may occur during the boot process or normal operation of the HP Tower Server tc2110.

Power-On Self Test (POST) Error Messages

A POST error message displays if an error condition occurs during the boot process of the HP Server tc2110, providing the video display and supporting circuitry are functioning. The following is an example of a post error message:

```
Error message 1 of 1:  Error code 0103
Keyboard not detected – Keyboard error
```

Some POST error messages include recommendations for troubleshooting or require that you press Enter to display recommendations.

NOTE	Do not remove or replace parts until you have reviewed the troubleshooting checklist in Chapter 6, "Troubleshooting."

Beep Codes

If the POST routines cannot display messages when an error occurs before the video display is initialized, the HP Server emits a buzzing sound followed by a series of beeps. If you get a blank screen on boot, but hear beeps, count the beeps and refer to the table below to interpret their meaning. If you miss the beep code, turn off the HP Server, press the on/off power button for five seconds or more, and then listen for the signal again.

Number of Beeps	Meaning
0	System OK. If there is a buzzing sound: • If you push the power button for more than 5 seconds, this is normal; there is no error. • The power button may be stuck. If there is no buzzing sound, the server has no power. This could mean: • Server is not connected to power. • Power supply failure. • System board failure.
1	Processor absent, not correctly connected or ZIP socket not closed.
2	Power supply is in protected mode.
3	No memory, bad memory modules, incompatible memory module.
4	Graphics card problem.
5	PCI device initialization failure.
6	Corrupted BIOS. You need to activate crisis recovery procedure.
7	BIOS terminal error.

6 Maintenance and Troubleshooting

Preventive Maintenance Procedures

Refer to the following table for preventive maintenance procedures used for the HP Tower Server tc2110. Be sure to turn off power to the server when cleaning it.

Preventative Maintenance Procedures

Component	Time Frame	Maintenance Procedure
Keyboard	Regularly	Dust with a damp, lint-free cloth. Lock the keyboard if there is that option on the HP Server; otherwise, power off the HP Server before cleaning.
Monitor screen	Regularly	Use HP Video Screen Cleaner or other appropriate monitor screen cleaner.
Mouse	Regularly	The ring surrounding the trackball on the bottom of the mouse opens and closes. Remove the ring and keep the trackball free of dirt. Do not use solvent to clean. Use a damp, lint-free cloth.
Tape drive heads	Monthly	Use the recommended cleaning method noted in the device's manual.
Cooling fans and grilles	6 Months	Check functions of cooling fans and clean the intake openings on the chassis. Be sure to power off and unplug the HP Server before cleaning. Use an industrial static-free vacuum cleaner to remove the dust and lint.

CAUTION	Do NOT use petroleum-based cleaners (such as lighter fluid or cleaners containing benzene, trichlorethylene, ammonia, dilute ammonia, or acetone. These chemicals could damage the keyboard's plastic surfaces.)

HP recommends the periodic cleaning of tape drive heads, capstans, and guides on the HP tape drive units and those products using high-density data cartridges and mini-data cartridges. This maintenance procedure prolongs tape and head life and helps reduce read/write errors due to dust and oxide. Call the HP Customer Support Center or check HP's Storage website for further information for preventative maintenance information on the HP tape drive.

Troubleshooting Tools

If you are having problems installing your HP Server, there are a number of tools available for troubleshooting.

The HP Server Online Documentation CD-ROM contains the following tools:

- Troubleshooting Information
- Parts Information
- List of Error Messages
- List of Beep Code Error Messages.
- DiagTools - The Startup CD-ROM (only available for the HP Server tc2100 and tc2110) provides the DiagTools utility for troubleshooting purposes: Boot to the HP Startup CD-Rom on the HP Server and execute the utility. The HP DiagTools Utility will automatically launch.

Got to HP's web site at **www.hp.com** to access the most comprehensive support material.

- Latest support news – Product and support information on HP Servers.

- Drivers and software downloads for HP Servers.
- HP Instant Support – Fast, web-based support that is automated and provides quick diagnosis and resolution of most computing problems.
- Step-by-step guides and documents on the Instant Support site for system troubleshooting and information.
- Technical information – Data sheets, application notes, configuration guides, installation tips, product papers, reference material and more.
- Compatibility Information – HP Accessories, OS/NOS, HP and third-party products.
- Manuals – Easy installation and configuration manuals for the HP Server.
- Parts and Service – Information on replacement parts, exploded views, and configuration.
- Tape backup support – Support for HP's SureStore Tape Backup products.

Other Support Information

- HP Server Registration
- Training Programs – HP STAR worldwide training and certification program.
- Warranty and enhanced services – Your guide to services for your HP Server.
- Proactive Notification – HP will email your customer information when it is available.
- Contacts – How to get help or provide feedback.

If you need assistance, HP recommends contacting your reseller or going to the HP website first. Refer to the topics listed above. If you need immediate telephone assistance, contact the HP Customer Support Center by referring to the list of telephone numbers in the HP Server Warranty and Service/Support booklet provided with the HP Server.

Troubleshooting

WARNING	Before removing a cover, always disconnect the AC power cords. Disconnect them to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect the telephone cables to avoid exposure to shock hazard from the telephone ringing voltages.

WARNING	Do NOT operate the HP Server for more than 10 minutes with any cover (including power supplies and disk drives) removed. Otherwise, damage to system components may result due to improper cooling airflow. However, you can safely remove a cover while the HP Server is running to remove and replace PCI hot-plug boards. For any other service activity requiring access to the system board or power distribution board, power down the HP Server and observe all safety precautions.

- For problems with the disk array controller board, refer to the appropriate HP NetRAID manual.
- For problems with the HP Instant Toptools, refer to the HP Instant Toptools Administrator Guide on the HP website at:

www.hp.com/toptools

- For general information on HP Server products, refer to:

www.hp.com and search for the specific product. These instructions do not generally cover third-party components or devices. Refer to the documentation that comes with the third-party device for diagnostic and troubleshooting information.

CAUTION	Always wear an antistatic wrist guard when working inside the HP Server.

- Ensure the HP Server is properly configured. Many HP Server problems are the result of incorrect system and SCSI subsystem configuration settings.
- Check the system BIOS Setup Utility by pressing F2 during the boot process.
- Check the SCSI configuration or the disk array configuration by entering the controller's setup utility.
- Boot to the HP Server Startup CD for access to configuration tools to help setup the HP Server.
- If it is a network-related error, determine if the user has enough memory and hard disk drive capacity. Run the diagnostics for the NIC. Consult with the network operating system manual.
- If it is a hardware error, follow the instructions to log users off the LAN and power down the HP Server. Reboot and watch for any POST error messages and listen for any beep codes as the HP Server goes through POST then look up the error message in Chapter 5 of this Service manual. If the HP Server passes POST, the HP DiagTools Utility can be used to further test the hardware.
- Use HP DiagTools Utility whenever possible to detect hardware problems. Insert the *HP Startup CD-ROM* into the CD-ROM drive and reboot the HP Server. Run HP DiagTools from the Startup CD-ROM and verify the Server's hardware integrity.

Besides HP Server DiagTools, use the standard set of tools recommended for troubleshooting:

- HP Server Assistant (NSA): This is a customizable software toolset that helps monitor and manage HP Servers over the network from and HP OpenView console. The NSA software has a server part and a management console, or client part.
- Toptools: HP Instant Toptools provides a set of web-based management tools that can be used to maintain and control the HP Servers that are running Microsoft Windows 2000, Novell NetWare/IntranetWare, or SCO UNIX.

Troubleshooting Checklist

1. Verify the error. Make sure it is not an erroneous error message. Is the error repeatable? Is the error message seen affecting the HP Server's operation or performance?
2. Always change only one component at a time.
3. Always check the most recently added items added, both hardware and software. Remove any third-party components.
4. Make sure the HP Server BIOS is updated to the latest version posted to HP's external website. Flashing/updating the system BIOS and clearing CMOS will resolve many different issues.
5. Make sure the firmware for the hard drives are kept current. Download and run the Hard Disk Drive Firmware Utility to verify if hard drive firmwares need to be updated. This utility is available from HP's external website.
6. Make sure all firmware/BIOS revisions on any controllers are kept current.
7. Use only HP-provided drivers for any HP devices used in the HP Server. This includes using HP drivers for the initial installation of any NOS (Network Operating System) that is supported on the specific HP Server.
8. Check all cable and power connections, including those in the rack. If the HP Server is not powering on, unplug the AC power cords and wait 20 seconds then plug the AC power cords in again and restart the HP Server. Check for normal operation.
9. Verify that all cables and boards are securely plugged into their appropriate connectors and slots.

If the problem still persists:

10. Simplify the HP Server's configuration. The minimum required:
    - Monitor
    - Keyboard
    - Mouse
    - 1 hard drive (may need to disconnect for hardware troubleshooting)
    - CD-ROM and Flexible disk drive (may need to disconnect for hardware troubleshooting)
11. Reconnect the power cords and power on the HP Server. If operational, power back down and reinstall one component at a time and power on the HP Server after the installation of each component to try and determine which component is causing the problem.

If the problem persists, call the HP Customer Support Center for further troubleshooting assistance.

BIOS Reset/Update/Recovery

Should you experience compatibility or stability issues with the HP Server, HP recommends starting the troubleshooting by first updating the system BIOS, which may fix the current problem. If the BIOS has become corrupt, it is possible to perform a BIOS reset, recovery, or update to correct the condition. A BIOS update/recovery diskette is created when the most current BIOS is downloaded from the HP Web site to be used in flashing the BIOS on the server. To perform a reset, an update, or a BIOS recovery, perform one of the following procedures.

BIOS Reset

If the HP Server needs the BIOS settings set to the factory defaults (the HP recommended values) due to possible corruption, perform the following steps. The default values have been selected to optimize the HP Server's performance.

NOTE	It is recommended that the system's setup and configuration settings be noted before resetting the system to the defaults in the BIOS Setup Utility.

1. Reboot the HP Server in a normal manner and press <F2> to enter the BIOS Setup Utility.
2. Press <F9> to load default values.
3. Press <F10> to save changes and exit the BIOS Setup Utility.

BIOS Update/Recovery

Use this procedure to update the HP Server system BIOS with the latest BIOS version. HP regularly posts a new version of the HP Server BIOS on the website to improve the HP Server's performance.

1. Provide a blank, formatted 3 ½" floppy disk.
2. Insert this diskette to any Windows PC with HTML browser and a connection to the Internet.

   http://www.hp.com
3. Locate and download the latest HP Server BIOS to the PC's hard drive. Find the file that was downloaded and double-click on the file and follow the instructions to extract the file to the floppy disk. This downloaded BIOS on the diskette becomes the BIOS update diskette.
4. Boot the HP Server with the BIOS update diskette in the flexible disk drive. The BIOS Utility Update program will start and you will be prompted to update the system BIOS.
5. After the BIOS update is complete, remove the BIOS update diskette and then reboot the HP Server.
6. Press <F2> to enter the BIOS Setup Utility and make the necessary changes needed in the BIOS Setup Utility, press <F10> to save the changes and exit the utility.
7. Label, date, and save this flexible diskette for use as a BIOS Recovery diskette.

NOTE If you do not have convenient access to the Internet, you can create a BIOS Update/Recovery diskette from the *HP Startup CD-ROM*. Please note that these CD-ROMs may not provide the most recent BIOS. To create the BIOS Update/Recovery diskette, run the *Startup CD-ROM* on any Windows PC with an HTML browser and follow the menu instructions.

Password Problems

The only way to resolve the issue of a forgotten Supervisor password is to clear the password by using the appropriate dipswitch on the system board. Refer to the appropriate section in this manual for the location of the password dipswitch..

Supervisor Password

1. Power off the HP Server. Remove the covers and locate the password dipswitch and move to the opposite position.
2. Power on the HP Server. When the memory count appears on the screen, power off the HP Server.
3. Move the password dipswitch back to the original position.
4. Power on the HP Server. The system BIOS Setup Utility will allow access to it now without having to enter any password.
5. A new Supervisor password can now be set from the system BIOS Setup Utility.

User Password

If you need to reset the User password and you know the Administrator password, perform the following steps:

1. Restart the HP Server.
2. During the boot process, press F2 to start the system BIOS Setup Utility.
3. Enter the Administrator password and once in the Setup Utility, go to the Security menu.
4. Scroll to the User Password field, and press ENTER on SET USER PASSWORD.
5. Enter the Administrator password as the old/current password and press ENTER.
6. Enter the new User password and press ENTER.
7. Reconfirm the new User password and press ENTER. This sets a new User password.
8. Exit out of the Setup Utility and save the changes to save the new password.

NOTE If you have forgotten the Supervisor or the User, your HP Server will function normally, but you will not be able to access the system BIOS Setup Utility until the password dipswitch is moved and reset.

Clearing the BIOS Configuration

NOTE It is recommended that the system's setup and configuration settings be noted before clearing the BIOS configuration as this will reset all settings back to the default.

The HP Server tc2110 system BIOS configuration (CMOS) may need to be cleared if the configuration has become corrupt or if incorrect settings were made in the BIOS Setup Utility.

1. Power off the HP Server tc2110.
2. Remove the left side cover.

3. To clear the CMOS memory, set the configuration switch 5 to the ON position.

Configuration and Password Switch Location

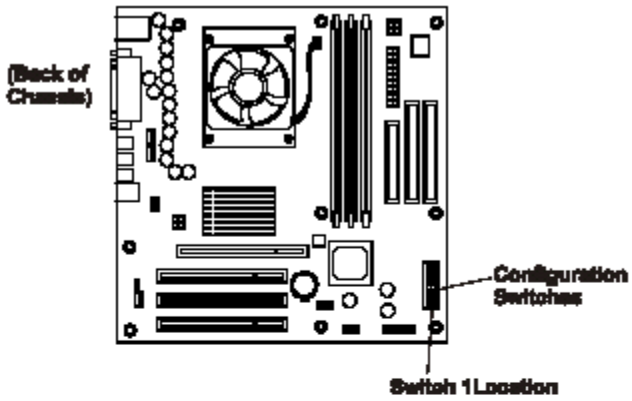
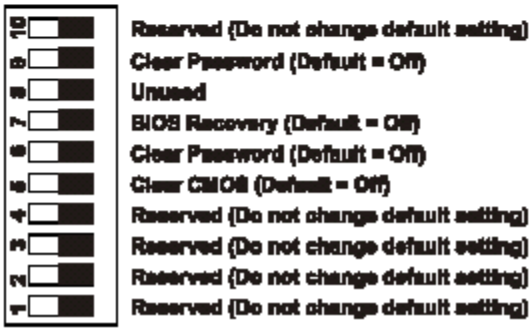


Figure 4-1. Location of Configuration Switches


Reserved (Do not change default setting)
Clear Password (Default = Off)
Unused
BIOS Recovery (Default = Off)
Clear Password (Default = Off)
Clear CMOS (Default = Off)
Reserved (Do not change default setting)
Reserved (Do not change default setting)
Reserved (Do not change default setting)
Reserved (Do not change default setting)

4. Power on the HP Server tc2110. A message indicates that the configuration has been cleared.
5. Power down the server.
6. Set the CMOS switch to the OFF position.
7. Replace the cover and power on the server.
8. On boot, press F2 to enter the system BIOS Setup Utility.
9. Make any necessary changes then press F10 to save and exit.

"Operating System Not Found" Message Appears

At the end of POST, if the HP Server states "Operating System Not Found", check the following:

1. Check for a non-bootable diskette in the flexible disk drive. If found, remove the diskette from the disk drive.
2. Check for a tape in the tape drive. If found, remove the tape cartridge from the drive.
3. Power on the HP Server. If the message still appears, reboot the HP Server and when prompted, enter the system BIOS Setup Utility and check that the device boot order is correct.
4. If a disk array controller is being used and the NOS is installed on a hardware array/container, verify that the array/container is in an optimal state by accessing and checking the disk array controller's setup utility during startup.
5. Boot to a DOS boot disk and check the partitions to make sure the primary partition is active.

If the problem persists, contact the HP Customer Support Center for further troubleshooting assistance.

Server Stops or Hangs While Starting Up

Typically, if the HP Server hangs before the end of POST completes, the problem is possibly a hardware problem or failure. If the HP Server hangs after POST completes, the problem is possibly due to an incorrectly configured or corrupt driver, operating system, application program, or a media (disk drive) error.

If the HP Server stops working or hangs starting up:

1. Review the Troubleshooting Checklist at the beginning of the chapter before continuing.
2. Try to verify exactly where the HP Server is stopping during POST. For example: is the HP Server stopping at the memory count or on a SCSI controller? Look for any error messages and listen for any beep codes and make note of them for further assistance in troubleshooting the problem.
3. If the failure persists, verify there is not a hardware problem by running HP DiagTools.

If the problem persists, contact the HP Customer Support Center for further troubleshooting assistance.

Power Problems

NOTE The HP Server supports the ACPI (Advanced Configuration and Power Management Interface) standard, which is a key component of a NOS's directed power management. The supported features are only available when an ACPI-compliant NOS is installed on the Server.

Refer to Chapter 1 in this manual BEFORE doing any further troubleshooting to verify that the HP Server tc2110 is not in a sleep mode. A steady AMBER power LED indicates the HP Server tc211o is under ACPI and in a sleep state.

1. Verify the HP Server's power cord is plugged in to a known good power source.
2. Is the On/Off/Sleep LED on the front of the HP Server tc2110 a steady green, which indicts it is getting power?
3. Remove the HP Server form any UPS or PDU and connect the HP Server directly to a power source.
4. Verify the AC power source is good:
   a. Verify the circuit breaker for the AC power outlet.
   b. If the breaker was off, verify all devices connected to the HP Server share the same circuit breaker and are the only devices on it.
   c. Reset the circuit breaker after reconfiguring the devices if needed.
   d. Verify the AC power outlet is not faulty by plugging in a known good device.
   e. Verify the DC power supply cable connected to the system board.
5. If the fans (system, power supply, and processor heat sink) are not audible and the above steps are verified:
   a. Disconnect the power cord/s for five minutes in order to reset the power supply's circuitry.
   b. With the power cord/s disconnected, remove the HP Server cover.

CAUTION Always wear an anti-static wrist guard when working inside the HP Server.

   c. Remove all the accessory boards, including any hard disk drive controller board or video board. Disconnect all mass storage power cords and cables.
   d. Plug the power cord/s back in and turn on the HP Server.

e. If power is still not getting to the HP Server, the power supply may be faulty.

Contact the HP Customer Support Center for further assistance before replacing any parts.

Video/Monitor Problems

NOTE The HP Server supports the ACPI (Advanced Configuration and Power Management Interface) standard, which is a key component of a NOS's directed power management. The supported features are only available when an ACPI-compliant NOS is installed on the Server.

Refer to Chapter 1 in this manual BEFORE doing any further troubleshooting to verify that the HP Server tc2110 is not in a sleep mode.

NOTE Take appropriate electrostatic discharge precautions prior to working inside the HP Server.

These are basic guidelines for troubleshooting video issues. They are arranged in such an order as to be used progressively. The HP Server should not be re-populated with components until video is produced. For each step taken, be certain to unplug the power for 30-60 seconds prior to powering the HP Server back on. For each power up attempt, allow at least 60 seconds for the HP Server to produce video.

NOTE If using a third-party video controller card and the onboard video controller (if applicable) was disabled, remove this controller card, connect the cable to the onboard video controller then clear the CMOS. This re-enables the onboard video. For instructions on clearing CMOS, refer to the HP Server Operations and Maintenance Guide.

1. Test the monitor on another machine to verify the monitor is not faulty.
2. Disconnect the HP Server from any console switch box during troubleshooting. Connect a known good monitor, keyboard, and mouse to the HP Server to troubleshoot.
3. Verify that the AC power source is good. If suspect, try another power source.

NOTE Verify that any fans and hard drives are spinning up. If no fans or drives are spinning up, see previous section on Power Problems.

If there is still no video:

4. Power off the HP Server and unplug form the power source and remove the covers.
5. Locate and toggle the “CLEAR CONFIG” switch to the “ON” position.
6. At the same time, check the processor speed switches to verify that they are set correctly.
7. Plug the HP Server into a power source and power on the HP Server. Quite often, just toggling the “CLEAR CONFIG” switch will restore video.

If there is still no video:

8. Power off the HP Server and unplug form the power source.
9. Remove all PCI controller cards.
10. Reseat the AGP video controller in the AGP slot.
    a. Disconnect power and SCSI connections from tape drives and hard drives.

b. Disconnect IDE and flexible disk drive cables.

c. Take the HP Server down to base memory (1 DIMM) and reseat that DIMM.

d. Plug the HP Server into a known good power source and power on the HP Server.

e. If video returns, reinstall the removed components one at a time back into the HP Server. One of the removed components may have been causing the no video problem.

f. After all the components are reinstalled, reset the HP Server's BIOS configuration switch back to the appropriate setting.

If the problem persists, contact the HP Customer Support Center for further troubleshooting assistance before replacing any parts.

Configuration Problems

The Configuration Cannot Be Saved and the Battery Loses Power or the Configuration Information is Frequently Lost

WARNING	There is a danger of explosion if the battery is incorrectly installed. For your safety, never attempt to recharge, disassemble, or burn the old battery. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

NOTE	Configuration information is saved in the CMOS on the system board. The CMOS battery is the power source that saves this information.

1. If the HP Server frequently loses the time and date, clear the CMOS and flash the system BIOS to the latest revision. See the previous section in this chapter for Clearing the BIOS configuration and updating the system BIOS.
   - After performing the BIOS flash, on reboot, enter the BIOS Setup Utility (<F2> during POST when prompted) and set the date and time.
   - Exit out of the BIOS Setup Utility making sure to save changes before exiting.
   - See if this resolves the issue.
2. If this does not resolve the issue, boot to the Startup CD and set the date and time from the appropriate menu. See if this resolves the issue.
3. If this does not resolve the issue, replace the CMOS battery. The battery is attached to the system board.
   - Turn off AC power to the HP Server.
   - Unplug the HP Server's power cords from the power source.
   - Remove the covers and locate the CMOS battery on the system board and replace the battery.
   - Power on the HP Server, and set the date and time from the BIOS Setup Utility (<F2> during POST when prompted).
   - Exit out of the BIOS Setup Utility, making sure to save changes before exiting.

On reboot, see if the issue is resolved with the good battery in the HP Server. If this still does not resolve the issue, please contact the HP Customer Support Center for further troubleshooting assistance before replacing any parts.

Printer Problems

If the printer does not work, do the following:

1. Verify that the AC power cord is plugged into the power source and the printer.
2. Ensure the printer power switch is ON and the AC outlet is working.
3. If the printer is plugged into a multiple-outlet box, make sure the switch on the outlet box is turned on and the circuit breaker (if applicable) is not tripped.
4. Ensure the printer is online and available for printing.
5. Verify the correct cables are being used and that the cables are connected properly. Make sure the cable pins are not bent.
6. Try a known good cable.
7. If the printer's parallel date cable is plugged into the HP Server after the server is on, reboot the HP Server.
8. Examine the printer for a paper jam.
9. Run the printer self-test. Refer to the printer's manual for instructions.
10. Ensure the correct port setting when configuring the printer.
11. Run the system BIOS Setup Utility (<F2> on POST when prompted) to verify the I/O port status. Make sure it is not disabled.)
12. Test another peripheral from the HP Server's parallel port to ensure functionality.

If the printer still does not work, contact the HP Customer Support Center for further assistance.

The Keyboard Does Not Work

NOTE	Use only an HP-Approved Keyboard as others may not work correctly.

If the keyboard does not work or a character is not displayed when a key is pressed:

1. Ensure that the keyboard is not locked, if the HP Server has this feature.
2. Ensure that the keyboard cable connections at the rear of the HP Server and at the back of the keyboard are secure.

NOTE	Make sure the keyboard is plugged into the keyboard port and not into the mouse port in the back of the server.

3. If the KVM switchbox is used with this HP Server, remove the keyboard and plug the keyboard directly into the keyboard port of the HP Server.
4. Try replacing the keyboard with a known good keyboard, and then reboot the HP Server.
5. If there is a keyboard extender cable, make sure the connection is secure or remove the extender and plug the keyboard directly into the HP Server.

If the problem persists, contact the HP Customer Support Center for more troubleshooting steps before replacing any parts.

The Mouse Does Not Work

The HP Server automatically detects a mouse when one is installed. If the mouse or other input device is not working, check the following:

1. Verify that the mouse cable is properly and securely connected to the HP Server or KVM switch box.
2. If a KVM switch box is used with this HP Server, remove the mouse and plug the mouse directly into the mouse port on the HP Server.

NOTE	Make sure the mouse is plugged into the mouse port and not the keyboard port.

3. Ensure that the mouse port does not have a resource conflict with another device. Use the system BIOS Setup Utility (F2) to check.
4. Ensure that the correct mouse driver has been installed onto the boot drive. Refer to the mouse installation manual or the operating system manual.
5. Replace the mouse with a known good mouse.

If the problem persists, the system board may need to be replaced. Contact the HP Customer Support Center for further troubleshooting assistance before replacing any parts.

Flexible Disk and Flexible Disk Drive Problems

If the HP Server cannot boot from, write to, or format a flexible disk, do the following:

1. Try booting from a known good flexible disk.
2. If there is a bootable CD in the CD-ROM drive, remove it. By default, the CD-ROM drive is first in the boot order, so if there is a CD-ROM disk in the drive, the HP Server will not boot to a bootable flexible disk.
3. Select the system BIOS Setup Utility (<F2> on POST when prompted) and verify the mass storage configuration is correct.

NOTE	If for some reason the system BIOS Setup Utility cannot be accessed, clear the CMOS. See Clearing BIOS Configuration previously in this chapter.

4. Ensure the disk is not write-protected.
5. Ensure that the disk drive is trying to be accessed. Look for an activity light on the drive.
6. Try another flexible disk.
7. Boot to the HP Navigator CD and try creating a disk form the Diskette Library. This will eliminate the NOS causing the problem since the Navigator is only using DOS.

Flexible Disk Drive Problems

1. Verify that the internal drive cables are securely attached and functional by inspecting the cables and reseating the connections at both ends.
2. If the cables are securely attached and the drive still does not work, replace the cable with a known good cable.

Environmental problems result from:

- Radiated Interference: sources include communications and radar installations, radio/TV broadcast transmitters, and hand-held receivers.
- Airborne contaminants: Sources include dust, smoke, and ashes. Steam from duplication equipment may result in intermittent disk errors.

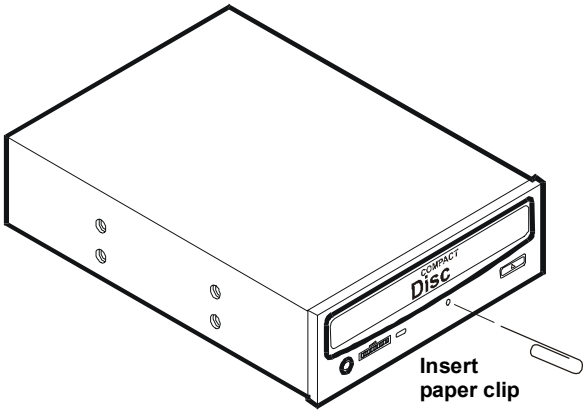
If the problem persists, call the HP Customer Support Center for further assistance before replacing any parts.

CD-ROM Problems

The CD-ROM Drawer Will Not Open

If the CD-ROM drawer fails to open when the Eject Button is pressed or with software commands, do the following:

1. Turn off the HP Server.
2. To open the drawer, inset a pointed object, such as a paper clip, into the emergency eject hole and push in about 1.75 inches (40 mm).



3. Remove the disk and close the drawer.
4. After the disk is removed, start the HP Server and try to open the drawer again with the Eject Button or software command.

If the drawer still will not open, call HP Customer Support for further assistance before replacing any parts.

The CD-ROM Drive is Not Working Properly

The CD-ROM drive provided with all the HP Server models is an IDE CD-ROM. If the CD-ROM drive does not work, do the following:

1. Review the basic IDE installation guidelines to ensure a proper configuration.
2. In addition, check the following:
   - Verify correct drivers are installed.
   - Verify there is a CD-ROM disk in the CD-ROM drive.
   - Verify the IDE Controller and devices are displayed during Power On Self Test (POST).
   - Verify all internal drive cables are securely attached and functional.
3. Verify that the Local Bus IDE Adapter item is correctly configured in the Setup program:
   - Power on the HP Server and press F2 to enter the BIOS Setup Utility when this option displays.
   - Check that **Both** is selected in the Local Bus IDE Adapter field.

If the problem persists, contact the HP Customer Support Center for further troubleshooting steps before replacing any parts.

NOTE	Check for Environmental Problems That Could Damage Disk Media and Disk Drive Heads.

Environmental problems result from:

- Radiated Interference: sources include communications and radar installations, radio/TV broadcast transmitters, and hand-held receivers.

- Airborne contaminants: Sources include dust, smoke, and ashes. Steam from duplication equipment may result in intermittent disk errors.

Server Will Not Boot From a CD-ROM Disk

1. Verify the CD-ROM disk is bootable.
2. Use the BIOS Setup Utility to verify that the CD-ROM Drive is first in the boot order. To do this:
   - Reboot the server and run the (BIOS) Setup Utility (pressing F2).
   - Scroll to the Boot menu.
   - If necessary, move the CD-ROM up in the boot order list. This ensures the CD-ROM will boot before any of the hard disk drives (IDE or SCSI).
   - Save and exit the Setup Utility.

If the problems persists, contact the HP Customer Support Center for further troubleshooting assistance.

SCSI Problems

The SCSI Boot Controller BIOS Has Trouble Loading The Boot Logical Drive (NOS drive)

1. Verify the SCSI boot controller is bannering (displaying) on POST.
2. Ensure that the SCSI boot controller's BIOS is enabled. Check this from the SCSI Setup Utility. To access this utility, enter CTRL C when a Symbios controller banners on POST or CTRL A when an Adaptec controller banners on POST.
3. Determine what the boot order is for the HP Server. To verify that the SCSI boot controller board is in the correct position in the boot order, enter F2 on POST to access the system BIOS Setup Utility. The boot order can be viewed and changed from this utility. If necessary, change the slot (if applicable) that the SCSI controller is in to change the location in the boot order.
4. If the problem persists:
   a. Clear CMOS and flash the system BIOS. See instructions previously in this chapter on the proper procedure to do this.
   b. Repeat step 3.
5. If you installed more than one SCSI controller, try disabling the BIOS on all other SCSI controller except for the SCSI boot controller. This lets the SCSI BIOS for the boot controller load and prevents conflicts with other SCSI controllers. If necessary, remove all the other SCSI controller boards except the SCSI boot controller until the issue is resolved.

Contact the HP Customer Support Center for further troubleshooting assistance.

A SCSI Controller Does Not Work At Initial Installation

Many SCSI controller problems are caused by an incorrect configuration rather than by faulty hardware. If the SCSI controller does not work after installation, do the following:

1. Verify the SCSI controller BIOS is bannering (displaying) on POST.
2. If more than one SCSI controller was installed, verify that each adapter is set to a separate BIOS address or disable the BIOS on all of the other adapters except the boot controller.
3. Make sure there are no resource conflicts.
4. For each device on the SCSI controller, check:
   - Each device has a unique SCSI address.
   - Do not set any device to SCSI ID 7. This is usually the controller SCSI ID.

If the SCSI banner still does not banner on POST, check the following:

NOTE	Wear an anti-static wrist guard when working inside the HP Server.

1. If the SCSI controller is an adapter board:
   a. Power off the HP Server. Unplug the power cord from the power source and remove the covers.
   b. Reseat the SCSI controller board in its slot.
   c. Replace the covers, plug the power cords back into a power source, and power on the HP Server.
2. If the SCSI controller still does not banner on POST:
   a. Do all the previous to power off the HP Server then move the SCSI controller board into another slot.
   b. If this still does not resolve the issue:
   - Clear CMOS (See the previous instructions in this chapter on Clearing the BIOS Configuration.)
   - Flash the system BIOS (See the previous instructions in this chapter on System BIOS Update.)

Contact the HP Customer Support Center for further troubleshooting assistance before replacing any parts.

A SCSI Device Stops Working

If a SCSI device stops working:

1. Verify it banners on POST or is seen in the SCSI Select Utility.
2. Run DiagTools and verify:
   a. SCSI Ids and any relevant switch settings.
   b. SCSI bus information.
3. If an accessory board was added recently, check for a resource conflict between the new board and an existing accessory boards.
   a. Remove the board and restart the HP Server.
   b. If this corrects the problem, the new board is either defective or it is trying to use a system resource used by another SCSI controller board.
   c. Try the accessory board in another slot.
4. Check for any recent changes or upgrades to the software. For example, has anyone moved, removed, or changed the configuration files or drivers? Refer to the software documentation for more information.
5. If you suspect hardware failure and there are no system error messages, check each component associated with the failure. Equipment failure is probably the most unlikely reason for a SCSI device failure.

Contact the HP Customer Support Center for further troubleshooting assistance before replacing any parts.

A SCSI Device Does Not Work After Installation

NOTE	The SCSI controller board supplied with some HP Servers come with a single channel SCSI controller board and cannot support internal and external SCSI devices on the same controller.

NOTE	Refer to the documentation provided with the SCSI device for any specific information regarding installation.

If a SCSI device does not work after installation, do the following:

1. If using a single channel SCSI controller for external devices, make sure not internal devices are connected on the internal channel of the SCSI controller. HP does not support using both internal and external connections on a single-channel controller, and a second SCSI controller board must be purchased for use with the external SCSI device.
2. Verify the SCSI BIOS is being executed properly. The internal and external SCSI device controllers display a banner during startup. The BIOS then checks for valid devices on the SCSI bus, and reports which devices are found. If the SCSI devices are installed and configured correctly, a list confirming the devices will banner on POST after the controller banners.
3. Verify the switch settings on the SCSI device/s are correct.
4. Verify each SCSI device is assigned a unique SCSI ID.
5. Ensure no SCSI device is set to SCSI ID 7. This SCSI address is generally used by the SCSI controller.
6. Ensure all installed SCSI controllers are configured correctly.
7. If the SCSI devices installed in an external connected to the HP Server operate in Ultra SCSI or FAST SCSI mode, this may cause a problem. The SCSI controller board and the internal SCSI devices normally provided with the HP Servers operate in Ultra 160 SCSI mode. The external SCSI devices may be slowing down or causing the internal SCSI controller board to be ineffective and therefore non-operational.
8. Check the SCSI cables for problems that may be caused by any recent HP Server maintenance, hardware upgrades, or physical damage.
9. Check the system BIOS version to ensure it is the most recently issued version. The most recent version is listed on HP's website.
10. Verify the SCSI bus is terminated at both ends. By default, HP Server SCSI controllers in external enclosures are terminated. When a device is connected to a connector on the SCSI bus, bus termination for that connector is disabled. Verify the last device on the bus is terminated

NOTE	Some tape drives do not banner on POST but will show up in the SCSI BIOS Utility for the controller and in the operating system.

Contact the HP Customer Support Center for further troubleshooting assistance before replacing any parts.

Processor Problems

Contact the HP Customer Support Center for further troubleshooting assistance before replacing any parts and if it appears that the HP Server tc2110 might be having a processor issue.

Memory Problems

NOTE	The HP Server tc2110 only supports HP 168-pin, PC 133 (133 MHz), 3.3V, unbuffered, ECC SDRAM DIMMS

The memory modules used for the HP Server tc2110 are DIMMS.

1. Review the troubleshooting checklist from this manual before you continue.
2. If memory problems are being experienced, power the HP Server off and on gracefully. This performs a "cold" restart rather than a "warm" restart by doing a CTRL-ALT-DELETE.
3. Verify that all the DIMMS are HP DIMMS.
4. Verify that all the DIMMS are the correct HP DIMMS for this particular HP Server.
5. Verify that all the memory is counted during the Power On Self Test (POST).
6. Run the HP DiagTools memory test.

CAUTION	Wear an anti-static wrist guard when working inside the HP Server.

If the problem persists:

1. Power off the HP Server, unplug the power cord from the power source and remove the left side cover.
2. Locate and reseat the memory modules.
3. Plug the power cord back into the power source and power on the HP Server.
4. Verify that all the memory is counted during the Power On Self Test (POST).

If the problem still persists:

1. Power off the server and unplug the power cord for the power source.
2. Remove all but one DIMM.
3. Plug the power cord back into the power source and power on the HP Server.
4. If the error is not present, power off and unplug the server then add another DIMM, continuing this process until all the DIMMS are installed or a failure occurs.
5. Verify the failure by reinstalling the DIMM by itself and attempt to duplicate the error.
6. Try the faulty DIMM in another memory slot to confirm that the slot is not defective.
7. Replace the defective DIMM.

Contact the HP Customer Support Center for further troubleshooting assistance if needed.

Network Interface Card (embedded or PCI) Problems

If the HP Server cannot connect to the network and all the LEDs are lit on the NIC:

1. Verify that there are no resource conflicts between the NIC and any other accessory. Do this from the system BIOS Setup Utility (<F2> on POST when prompted).
2. Reboot the HP Server and log into the NOS.
3. Ensure the latest and correct HP drivers are being used for the NIC.
4. Ensure the port on the switch or hub (or other device) has the same speed and duplex settings as on the NIC.

CAUTION	Setting an incorrect duplex mode can degrade performance, cause data loss, or result in lost connections.

5. Test the NIC as directed in the installation tasks for each NOS. This information is in the HP Server's Installation Manual. Also check the README files on the support driver's disk.
6. Use the PING command to verify TCP/IP configuration.
   a. Ping the IP address of the default gateway. If the PING command fails, verify that the default gateway IP address is correct and that the gateway (router) is operational.
   b. Ping the IP address of a remote host (a host that is on a different subnet). If the PING command fails, verify that the remote host IP address is correct, that the remote host is operational, and that all of the gateways (routers) between this computer and the remote host are operational.
7. Directly connect two devices (with no hub, switch, or other device) using a "crossover" cable. PING the other computer's IP address.

NOTE	The PING command uses Internet Control Message Protocol (ICMP) Echo Request and Echo Reply messages. Packet filtering policies on routers, firewalls, or other types of security gateways might prevent the forwarding of this traffic.

LEDs are not lit on the NIC

No lit LEDs probably indicates a bad network cable, hub connection, or other network error.

1. Ensure that the cabling is installed correctly:
   a. Try another known good network cable.
   b. Try another network connection (another hub, switch, etc.)
   c. Connect the NIC to a known good network connection.

If there are still no lit LEDs, do the following:

2. Power off the HP Server and unplug the power cord/s from the power source. Remove the left side cover.

NOTE	The HP Server tc2110 has an integrated NIC so skip the following steps unless a PCI NIC is installed in the server.

CAUTION	Always wear an antistatic wrist guard when working inside the HP Server.

3. Locate the NIC and reseat it in its slot.
4. Replace the covers; plug in the power cord/s to a power source, and power on the HP Server.
5. If the problem persists, perform previous step 2 and 3 but move the NIC to another slot.
6. Replace the covers; plug in the power cord/s to a power source, and power on the HP Server.

If the problem persists, contact the HP Customer Support Center for further troubleshooting assistance before replacing any parts.

7 Replacing Parts

This chapter describes the removal and replacement procedures for the user serviceable components in the HP Tower Server tc2110.

NOTE	The HP Server tc2110 is highly customer serviceable. All major parts are easily accessible and replaceable.

Safety Information

Follow the procedures listed below to ensure safe handling of components and to prevent harm to both you and the server:

- Use an anti-static wrist strap and a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.
- Do not wear clothing subject to static charge build-up, such as wool or synthetic materials.

WARNING	Hazardous voltages are present inside the server. Always remove AC power from the processor and other associated assemblies while working inside the unit. Serious injury may result if this warning is not observed.

Service Tools Required

Service of this product may require one or more of the following tools:

- Electrically Conductive Field Service Kit (P/N 9300-1155)
- CE Peripheral Exerciser Disk Kit (45935-63210)
- Datacomm Test Hood, 9-pin (24540-60010)
- Datacomm Test Hood, 25-pin parallel (24540-60011)
- 1/4 inch Flat Blade Screwdriver
- T-15 Torx® Screwdriver

Mass Storage Devices

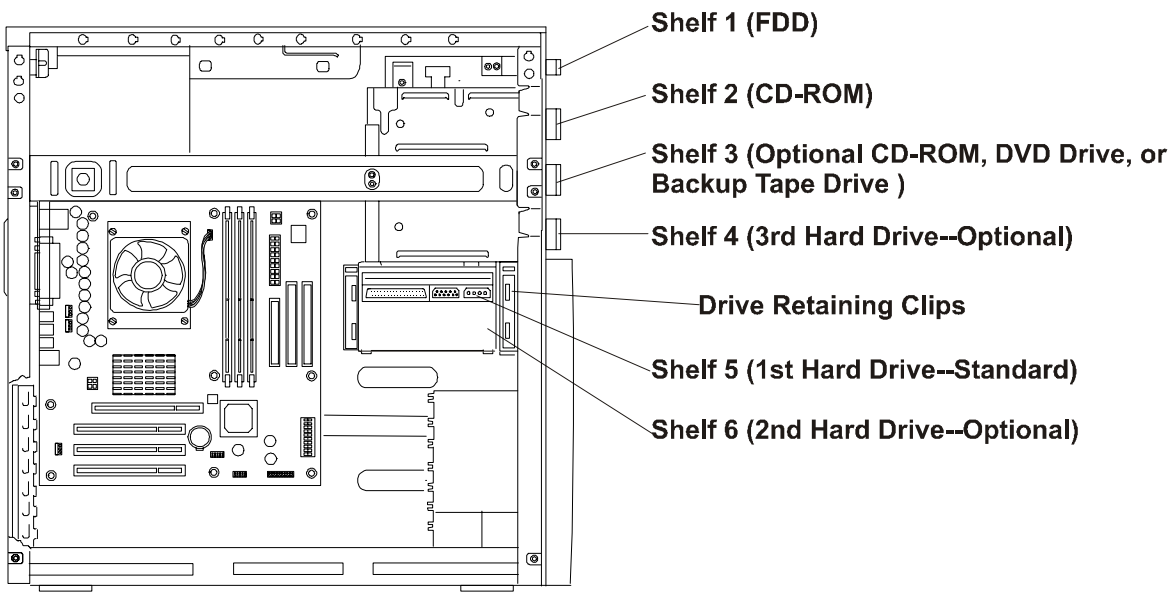

Shelf 1 (FDD)
Shelf 2 (CD-ROM)
Shelf 3 (Optional CD-ROM, DVD Drive, or Backup Tape Drive)
Shelf 4 (3rd Hard Drive--Optional)
Drive Retaining Clips
Shelf 5 (1st Hard Drive--Standard)
Shelf 6 (2nd Hard Drive--Optional)

Figure 7-1. Mass Storage Device Locations

Removing the Flexible Disk Drive

1. If the Server is operating, power down the Server, and if necessary, backup mass storage devices.
   Refer to Chapter 1, “Controls and Indicators” for instructions.
2. Disconnect the power cord and any external cables connected to the Server.
   If necessary, label each one to expedite re-assembly.
3. Remove the left side cover.
4. Remove the upper bezel.
5. At the rear of the flexible disk drive (FDD), carefully disconnect the power and data cables.
6. Remove the flexible disk drive:
   a. Press in on both release tabs to release the FDD assembly.
   b. Pull the FDD assembly out of the chassis.
   c. Remove the two screws from the side of the FDD assembly.

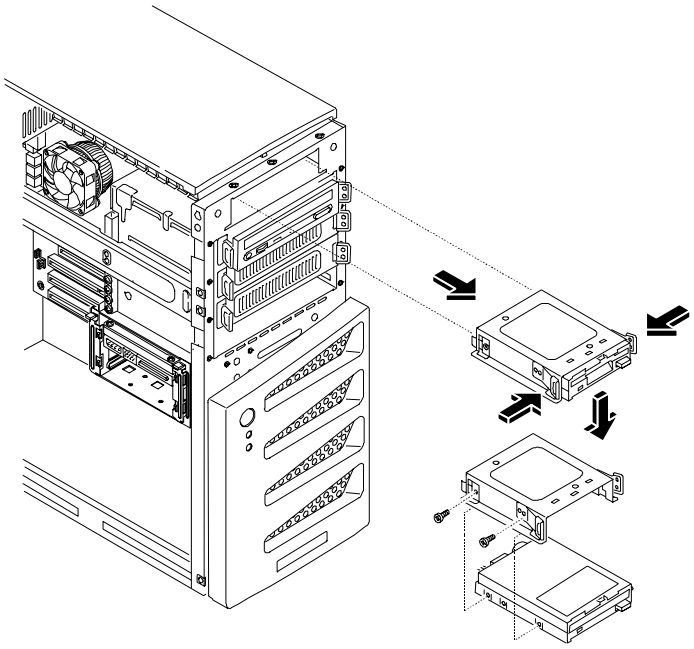


Figure 7-2. Removing the Flexible Disk Drive (FDD)

7. Remove the flexible disk drive from the tray.
8. Place the flexible disk drive in an anti-static bag.

Replacing the Flexible Disk Drive

1. If not already mounted, insert the new drive in the tray (pin side first), and then replace the side screws.
2. With the cable connectors toward the rear of the chassis, slide the FDD assembly all the way into the chassis, until the FDD assembly snaps into place.

   The flexible disk drive is only mounted in the top shelf (shelf 1).
3. At the rear of the flexible disk drive, carefully connect the power and data cable.
4. Replace the upper bezel.
5. Replace the left side cover.
6. Replace the external cables and power cord.
7. Power on the Server as described in Chapter 1, “Controls and Indicators.”

Removing the CD-ROM

16. If the Server is operating, power down the Server.

    Refer to Chapter 1, “Controls and Indicators” for instructions.
17. Disconnect the power cord and any external cables connected to the Server.

    If necessary, label each one to expedite re-assembly.
18. Remove the left side cover.

    Refer to “Opening and Closing the HP Server” in Chapter 3.
19. Remove the upper bezel.

    Refer to “Opening and Closing the HP Server” in Chapter 3.
20. At the rear of the CD-ROM, carefully disconnect the power and data cables.
21. Remove the CD-ROM:

    Press in on both release tabs to release the CD-ROM tray assembly.

Pull the CD-ROM assembly out of the chassis.

Remove the four screws (two on each side) from the CD-ROM tray.

22. Place the CD-ROM in an anti-static bag.

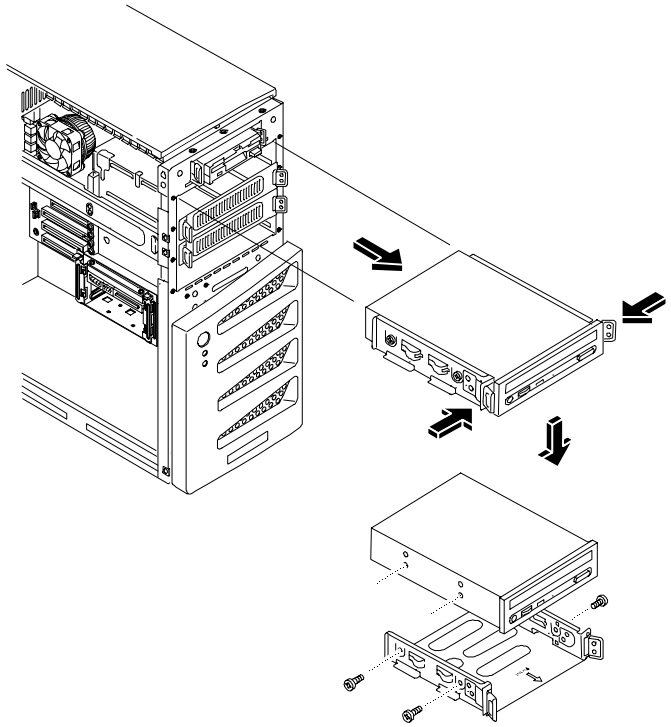


Figure 7-3. Removing the CD-ROM

Replacing the CD-ROM

1. Remove the CD-ROM from the shipping container.
2. Set the jumper on the back of the CD-ROM to "CS" (Cable Select). Refer to the CD-ROM documentation for detailed instructions.
3. If not already mounted, place the CD-ROM into the CD-ROM tray and secure it using the four screws.
4. Guide the CD-ROM tray into the chassis opening, with the cable connectors of the CD-ROM toward the rear of the chassis.

   The first CD-ROM must be mounted in the second shelf.
5. Push the CD-ROM tray all the way into the chassis until the CD-ROM tray snaps into place.

   The two release tabs should click when in place.
6. At the rear of the CD-ROM, carefully connect the power and data cables.

   The IDE CD-ROM uses one connector on the cable from the IDE-2 connector, leaving one connector for an optional third hard drive in shelf 4 or an optional IDE device in shelf 3.
7. Replace the upper bezel.
8. Replace the left side cover.
9. Replace the external cables and power cord.
10. Power on the Server as described in Chapter 1, "Controls and Indicators."

Removing a Backup Tape Drive

This procedure is used to remove the optional HP DAT 24i backup drive mounted in the third shelf.

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, "Controls and Indicators" for instructions.

2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the left side cover.
4. At the rear of the backup tape drive tray, carefully disconnect the power and data cables.
5. Remove the backup tape drive tray by:
   a. Pressing in on both release tabs to release the backup tape drive tray.
   b. Pull the backup tape drive tray out of the chassis.
   c. Remove the four screws (two from each side) securing the tray to the backup tape drive.
6. Place the backup tape drive tray in an anti-static bag.

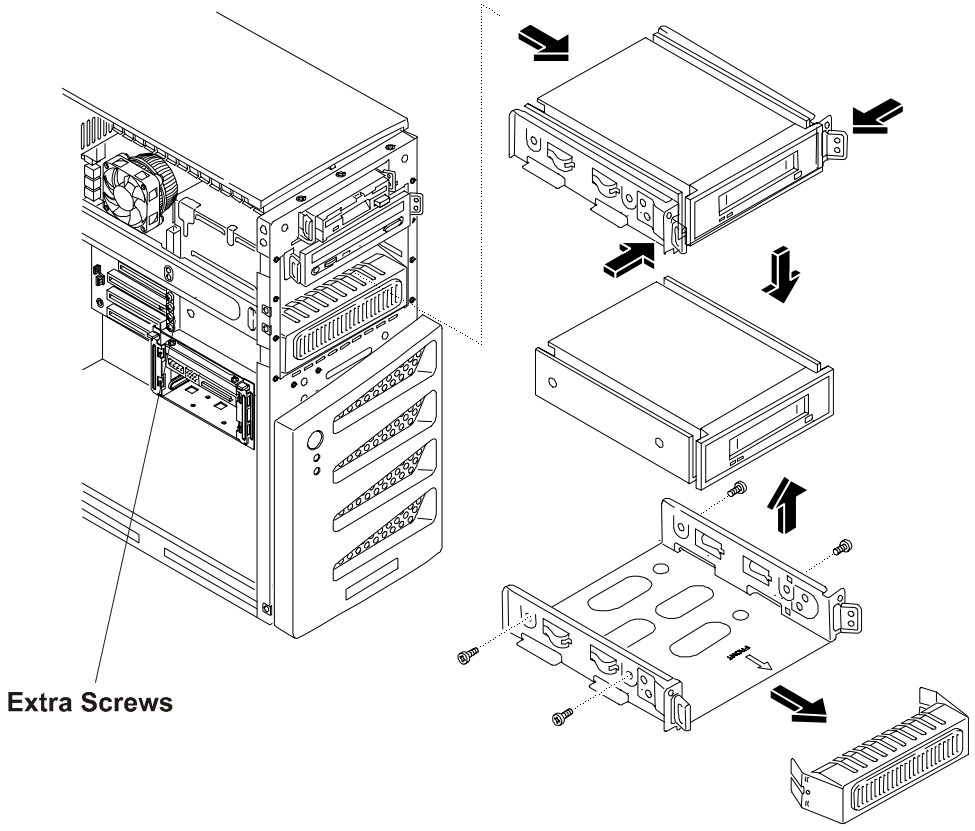


Figure 7-4. Removing the Backup Tape Drive

Replacing a Backup Tape Drive

This procedure is used to replace the optional HP backup tape drive mounted in the third shelf. In SCSI models, the optional HP backup tape drive may slow down access time for the Ultra-160 SCSI hard drives. If this is the case, HP recommends adding another single channel SCSI controller to control the slower backup tape drive.

1. Remove the HP backup tape drive from the shipping container.
2. Make any settings required by the HP backup tape drive documentation.

The SCSI backup tape drive should not be terminated, but if it is remove the termination jumper. The default SCSI address for HP backup tape drive is normally set to ID address = 3.

3. Attach the backup tape drive to third mounting tray using the four screws on the sides of the tray.

   The optional HP SureStore DAT 24i backup tape drive normally comes with 5¼ inch mounting brackets installed on the tape drive. If not, follow the instructions provided with the tape drive to connect the 5¼ inch mounting brackets to the tape drive, before installing the tape drive into the third drive tray.

4. Guide the backup tap drive tray into the chassis opening, with the cable connectors toward the rear of the chassis.
5. At the rear of the backup tap drive tray, carefully connect the power and data cables.

   The optional HP backup tape drive comes with a 50-to-68-pin adapter to connect to a 68-pin SCSI cable used for connection of backup tape drive.

6. Replace the upper bezel.
7. Replace the left side cover.
8. Replace the external cables and power cord.
9. Power on the Server as described in Chapter 1, “Controls and Indicators.”

Removing a Hard Disk Drive (Tray Mounted)

This procedure is used to remove the third hard disk drive (HDD) mounted in the fourth shelf.

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.

2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the left side cover.
4. At the rear of the HDD tray, carefully disconnect the power and data cables.
5. Remove the hard disk drive (HDD):
   a. Press in on both release tabs to release the HDD tray.
   b. Pull the HDD tray out of the chassis.
   c. Remove the four screws, from below the HDD tray.
6. Place the HDD in an anti-static bag.

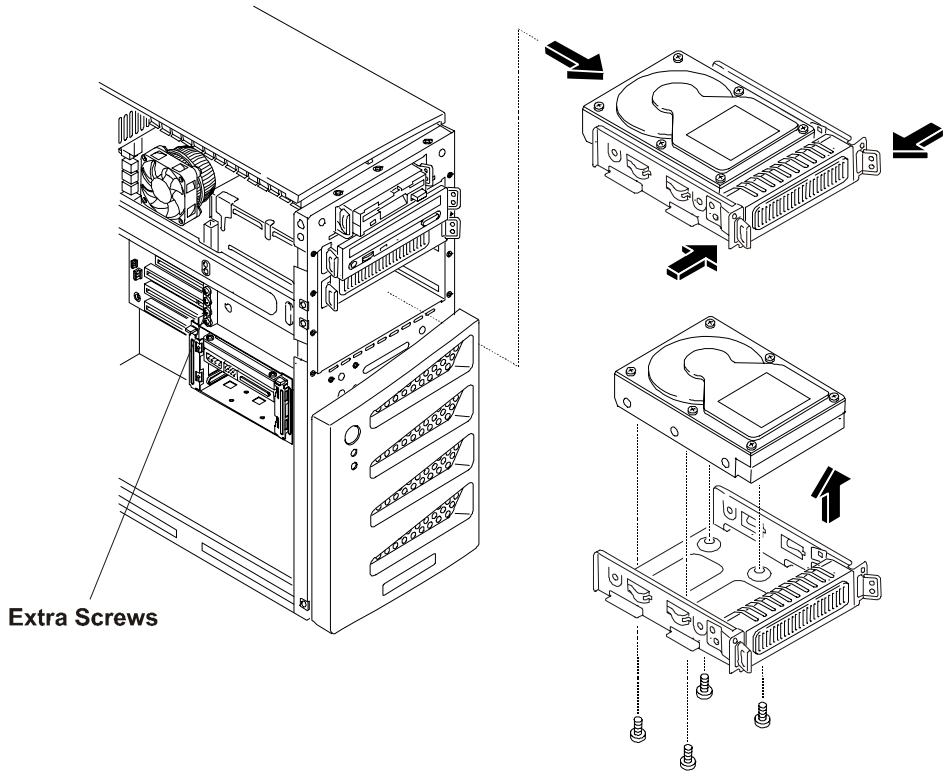


Figure 7-5. Removing Hard Disk Drive (HDD) and Tray

Replacing a Hard Disk Drive (Tray Mounted)

Follow these steps to replace the third hard disk drive (HDD) mounted in the fourth shelf. The second and third drive trays are identical, but the forth drive tray is reserved for a hard drive (IDE or SCSI). The fourth drive tray provides four raised mounting posts to mount hard drives without the use of any mounting brackets.

1. Remove the hard disk drive from the shipping container.
2. Set the jumper on the back of the drive to "CS" (Cable Select). Refer to the hard disk drive documentation for detailed instructions.
3. Attach the third HDD to mounting tray using the four screws at the bottom of the tray.

CAUTION	All mounting screws used with the hard disk drive must be #6-32 and not exceed ¼-inch in length. Longer screws may cause internal damage to the mass storage device. Damage caused by incorrect mounting screws is not covered by the HP warranty.

4. Guide the HDD tray into the chassis opening, with the cable connectors toward the rear of the chassis.
5. At the rear of the HDD, carefully connect the power and data cables.

   For IDE models, the third HDD is connected to the cable for IDE-2.

   For SCSI models, the SCSI cable has five connectors and one termination. There should be a connector available for the third HDD.
6. Replace the upper bezel.

NOTE	If this is the initial installation of a hard disk drive in this location, it is necessary to remove the bezel drive cover from the upper front bezel.

7. Replace the left side cover.

8. Replace the external cables and power cord.
9. Power on the Server as described in Chapter 1, “Controls and Indicators.”

Removing a Hard Disk Drive (Drive Cage Mounted)

The replacement of the mass storage cage mounted drives is the same for IDE or SCSI devices. The first hard disk drive (IDE or SCSI) is always mounted in the top (shelf 5) of the hard disk drive cage. The second hard disk drive should be mounted just below it (shelf 6).

CAUTION	Install and remove connectors carefully, and avoid displacing any pins.

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.
2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.
3. Remove the left side cover.
4. Disconnect the data and power connectors from the drive.
5. Press and release the retaining clips at the side of the drive cage.
6. Slide the drive out of the drive cage.

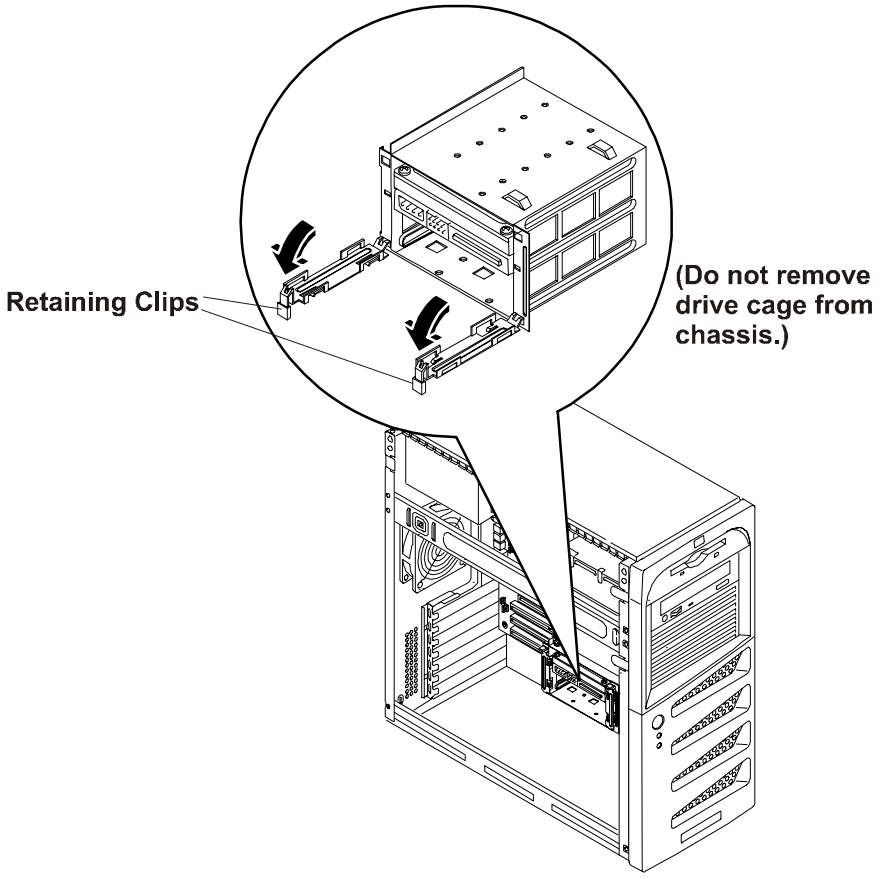


Figure 7-6. Releasing the Retaining Clips

7. Remove the four screws to remove the rails from the drive.
8. Place the removed drive in an anti-static bag for protection.

Replacing a Hard Disk Drive (Drive Cage Mounted)

NOTE If the hard disk drive (HDD) you are planning to install already has a mounting tray attached, you must remove it before you can install the drive into the drive cage.

1. Set the jumper on the back of the drive to "CS" (Cable Select). Refer to the hard disk drive documentation for detailed instructions.
2. Align and screw the rails to the new drive.

   Use the shoulder screws located above the drive cage.
3. Slide the HDD into the drive cage opening.

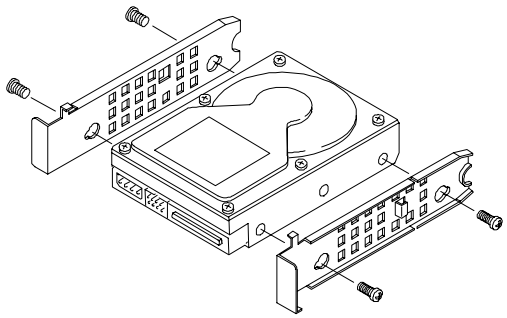


Figure 7-7. Attaching the Rails

4. Connect the power and data cables to the disk drive.

   For the IDE model, use the two connectors on the primary cable (IDE-1) to connect the IDE drives. The secondary cable (IDE-2) is intended for the IDE CD-ROM and an optional IDE device (shelf 3) or third drive (shelf 4).

   For the SCSI model, use the SCSI cable, which has 5 connectors and a termination on the end of the cable. Typically, the SCSI cable is already folded, allowing you to use the available connectors on the SCSI cable nearest the drive cage.
5. Replace the left side cover.
6. Replace the external cables and power cord.
7. Power on the Server as described in Chapter 1, "Controls and Indicators."
8. Verify the new configuration by checking the HP Summary screen. To access the HP Summary Screen, press F8, and then press Esc when the HP logo appears during startup.

DIMMs

NOTE Use only memory modules provided for your HP Server model. Install only 128 MB, 256 MB, or 512 MB unbuffered ECC SDRAM modules. To ensure that you have the correct DIMMS, refer to HP Order Assistant at http://www.hp.com

Removing DIMMs

Use this procedure to upgrade DIMMs or replace a defective DIMM.

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, "Controls and Indicators" for instructions.
2. Disconnect the power cord and any external cables connected to the Server.

If necessary, label each one to expedite re-assembly.

3. Remove the left side cover.

WARNING	The power supply will continue to provide standby current to the HP Server until the power cord is disconnected from the AC power source.

4. Lay the Server on its side (components showing).
5. Select the desired DIMM and open the retaining latches completely.

   This forces the DIMM up in the slot and makes it easier to remove.
6. Lift the DIMM completely away from the slot.
7. Place the DIMM in its anti-static container.
8. Repeat Steps 5-7 for as many DIMMs as you need to remove.

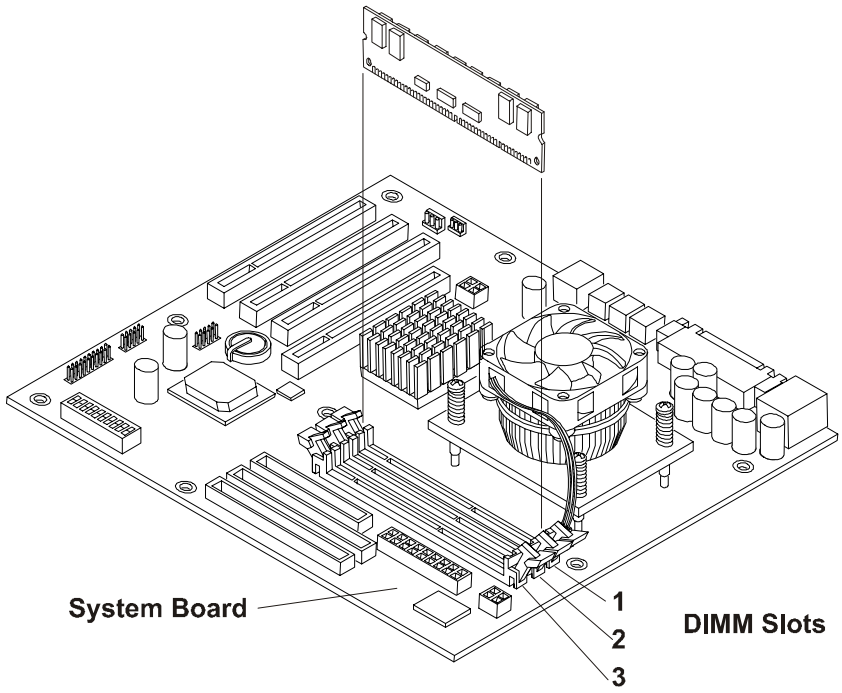


Figure 7-8. Removing DIMMs from System Board

Replacing DIMMs

1. Choose a DIMM slot for the desired DIMM.

   DIMM sizes may be mixed on the system board and may be loaded in any order (1 through 3). However, HP recommends starting at slot 1 and filling the slots in order: 1, 2, and 3. Empty slots between DIMMs are permitted.
2. Spread the two retaining latches on the slot outward.

CAUTION	Use only HP DIMMs, which are 168-pin, 3.3V, PC133 (133 MHz), and unbuffered ECC SDRAM DIMMs. The EDO DIMMs and PC 100 SDRAM DIMMs from earlier HP Server models will fit into the DIMM slots in the HP Server tc2110, but the EDO DIMMs and PC 100 SDRAM will not function properly. HP's warranty does not apply to non-HP parts.

3. Remove a DIMM from its protective container, handling the module by its edges.

   If necessary, lay it on an anti-static surface until you are ready to install it.

4. Align the notches on the DIMM with the keys on the slot.

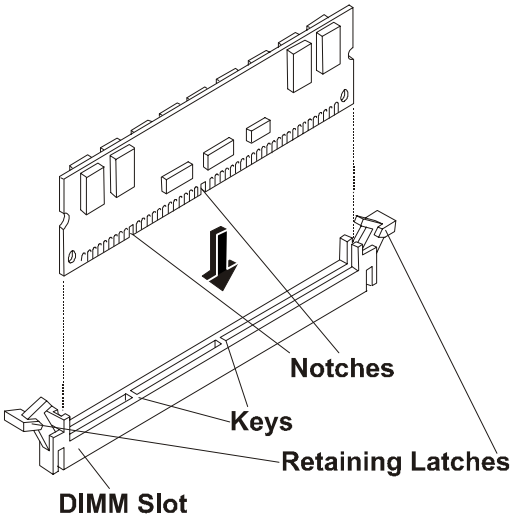


Figure 7-9. DIMM to Slot Alignment

5. Holding the DIMM at 90 degrees to the system board, press the DIMM fully into the slot until the retaining latches close.

   If the latches do not close, the DIMM is not inserted correctly.

6. Repeat Steps 1-5, to install all of the remaining DIMMs for your memory configuration.
7. Replace the left side cover.
8. Replace the external cables and power cord.
9. Power on the Server, as described in Chapter 1, “Controls and Indicators.”

   If the DIMMs are not seated properly you may get a blank screen.

NOTE	Most DIMMs are dimensionally identical, so, if you have two or more DIMMs installed, you may verify all DIMMs are seated by sliding a straight edge (a pen, for example) across the top edges and verify it remains in continuous contact with all of the DIMMs.

Processor

Use the procedures in this section to remove and replace the heat sink-cooling fan and the processor.

CAUTION	Wear a wrist-strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure the metal of the wrist-strap contacts your skin.

Removing the Heat Sink and Cooling Fan

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.

2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the left side cover.

WARNING	The power supply will continue to provide standby current to the HP Server until the power cord is disconnected from the AC power source.

4. Lay the Server on its side (components showing).
5. Disconnect the cooling fan power cable from the connector on the system board.
6. Remove the screws securing the heat sink-cooling fan. Remove the heat sink by twisting and lifting it.

NOTE	The heat sink on your HP Server tc2110 may look different than the one shown in the illustration. If the heat is secured with thumb latches, press to unhook the thumb latch, then lift the heat sink and release the hook latch.

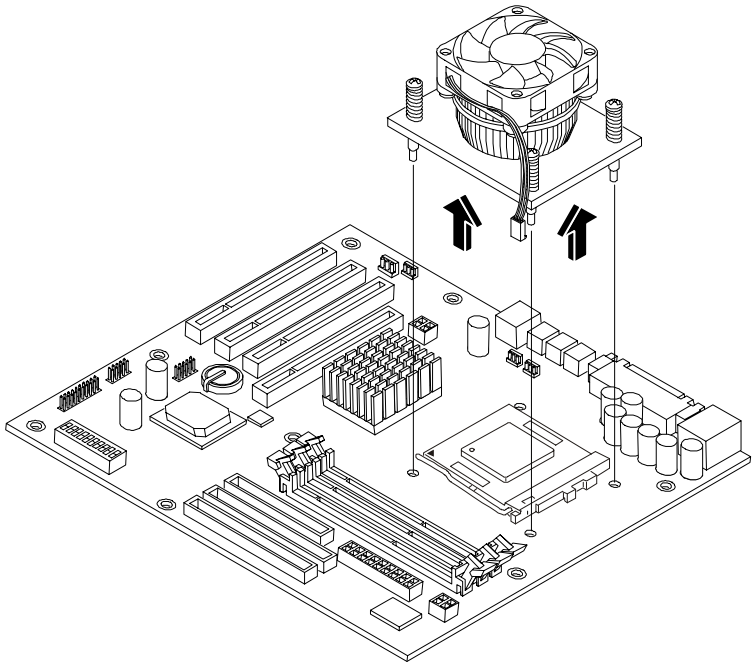


Figure 7-10. Removing Heat Sink and Cooling Fan

7. If the processor is stuck to the heat sink, carefully remove the processor from the heat sink, using flat tool such as a screwdriver.

Removing the Processor

2. If you have not removed the heat sink-cooling fan assembly, do so now before continuing.

CAUTION	Wear a wrist-strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure the metal of the wrist-strap contacts your skin

3. Open the ZIF lever completely to allow removal of the processor.

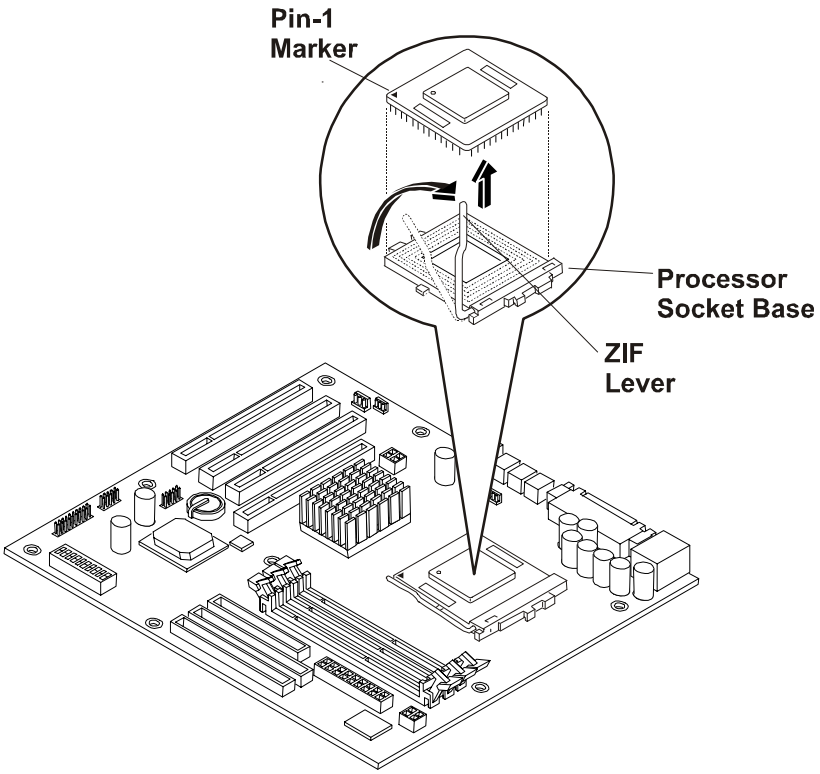


Figure 7-11. Removing the Processor

4. Grasp the processor by its edges and lift it out of the processor socket.
5. Place the processor on a static-dissipating work surface or into an anti-static bag.

Replacing the Processor

5. Locate the pin-1 marker on the processor before installing the processor.

NOTE	If you are upgrading the processor to a faster processor speed with a different front side bus (FSB) speed than the previous processor, the system board will automatically detect a need for a faster FSB speed and change accordingly. However, this Server only supports 100 MHz and 133 MHz FSB speeds.

6. Open the ZIF (Zero Insertion Force) lever to allow access to the processor socket.

   Pull the ZIP lever up and away from the ZIF socket and then raise it to a full 90° to the system board.

7. Align the processor over the empty processor socket.

   The socket has a mark for pin-1 that should match the mark for pin-1 on the processor near the end of the ZIF lever.

CAUTION	Ensure you align pin-1 of the processor with pin-1 of the processor socket or pin damage will occur.

8. Insert the processor into the socket and close the ZIF lever to fully seat the processor.

   You should hear the ZIF lever click when it closes properly.

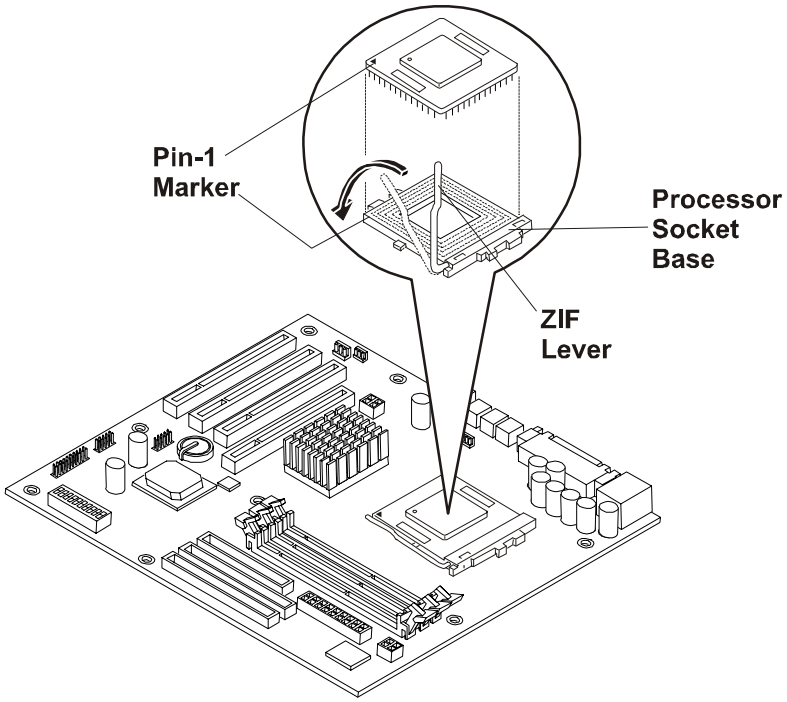


Figure 7-12. Replacing the Processor

Replacing the Heat Sink and Cooling Fan

Once the processor is installed, the heat sink-cooling fan must be installed on top of the processor. The thermal interface material on the bottom of the heat sink provides thermal bonding between the heat sink and processor.

CAUTION	To prevent overheating or a possible system crash, use only the heat sink-cooling fan assembly specified for the HP Tower Server tc2110.

9. Remove the heat sink-fan assembly from the shipping container and ensure you do not touch the thermal patch on the bottom of the heat sink.
10. Verify the thermal patch has not been damaged (missing thermal material from the patch) and if necessary, remove the protective covering from the thermal patch.
11. If the thermal patch has been damaged, peel it off the heat sink and replace it with the thermal interface material provided in the installation replacement kit.

    Your installation kit may come with a thermal patch or thermal grease. If a patch is provided, affix the patch to the bottom of the heat sink. If grease is provided, squeeze the entire contents of the tube on the center of the processor.
12. Secure the heat sink using the springs and screws or thumb latches, depending on your heat sink model. If your heat sink uses thumb latches, hold the heat sink in place and press down firmly on the latches.

NOTE The heat sink on your HP Server tc2110 may look different than the one shown in the illustration and secure with thumb latches instead of screws.

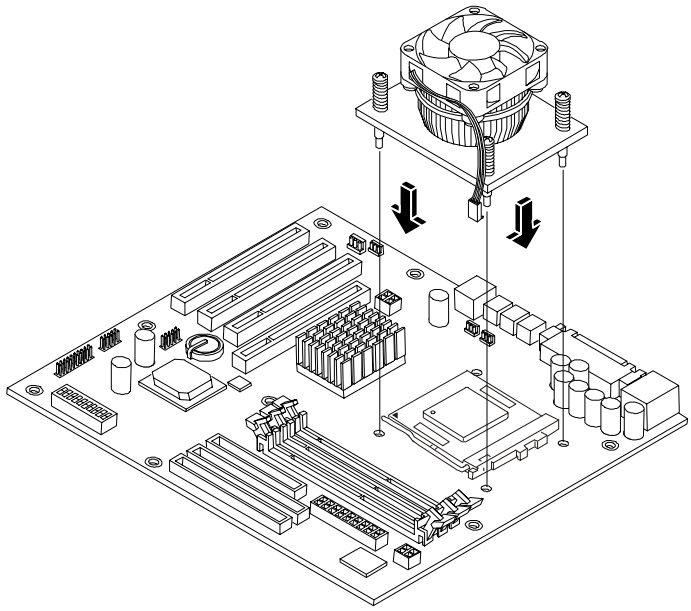


Figure 7-13. Replacing Heat Sink-Cooling Fan on the Processor

CAUTION Ensure you have made good contact with the processor to avoid thermal overheating. If you have not made good contact with the processor, it will overheat within 20 seconds of power on, possibly causing a system crash before completing the boot process and causing damage to the processor.

13. Connect the cooling fan power cable to the fan connector on the system board.

CAUTION Failure to connect the cooling fan to its power connector may cause the Server to shut down with no messages displayed and possibly damage the processor.

14. Replace the left side cover.
15. Replace the external cables and power cord.
16. Power on the Server as described in Chapter 1, “Controls and Indicators.”

    You may have to reboot the Server so the BIOS will recognize the new processor.

Accessory Boards

The system board in the HP Tower Server tc2110 provides one AGP card (installed) and three PCI slots (P1 through P3). The SCSI model requires the first slot (P1) for the SCSI controller board. For a list of tested PCI boards, check for compatibility in the Hardware Tested Products list for the HP Server tc2110 under the Technical Support topic for the specific NOS used in the Server at HP’s web site:

http://www.hp.com/

Removing Accessory Boards

To remove an accessory board, refer to the following procedure.

1. If the Server is operating, power off the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.

2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Remove the left side cover.

WARNING	The power supply will continue to provide standby current to the HP Server tc2110 until the power cord is disconnected from the AC power source.

CAUTION	Wear a wrist-strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure the metal of the wrist-strap contacts your skin.

4. Lay the Server on its side with the system board facing up (component side up).
5. Remove any cables attached to the accessory board.

   If necessary, label each one to expedite re-assembly of a replacement board.

6. Remove the slot cover latch by:
   a. Lift up on the tab of slot cover latch.
   b. Raise the slot cover latch up from the slot covers.
   c. Remove it from the chassis and keep it for reassembly.

      You may need to lift the slot cover latch out of its retainer before lifting it out of the chassis.

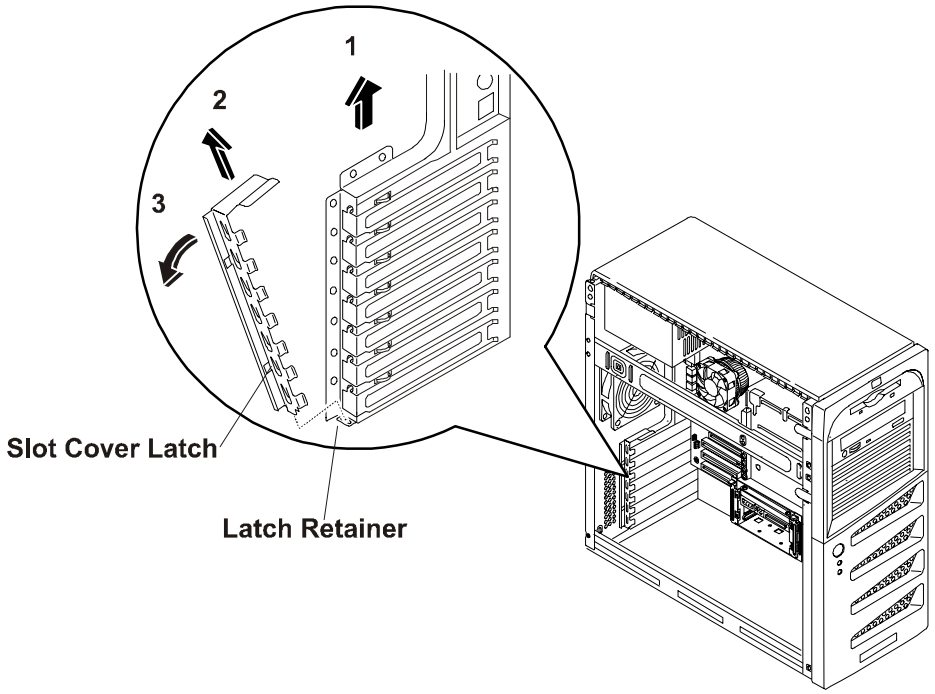


Figure 7-14. Removing Slot Cover Latch

7. Lift the accessory board up and away from the slot.
8. Place the accessory board and any cables in an anti-static container.

Replacing Accessory Boards

1. Read the documentation included with the accessory board and follow any special instructions.
2. If your installing the accessory board into a new PCI slot, continue with Step 3.

   If the accessory board is a replacement for a defective board, skip to Step 5.

3. Remove the slot cover latch by:
   a. Lifting up on the tab of slot cover latch with your finger.
   b. Raise the slot cover latch up away from the slot covers.
   c. Remove it from the chassis and keep it for reassembly later.

      You may need to lift the slot cover latch out of its retainer before lifting it out of the chassis to remove the slot cover latch.
4. Select the desired accessory slot cover, slide the top of the slot cover away from the chassis, and then lift it up and out of the chassis as shown in the following illustration.
5. Slide the accessory board into the desired PCI slot and then press down to seat the board.
6. Ensure the accessory board is seated properly in the PCI slot.

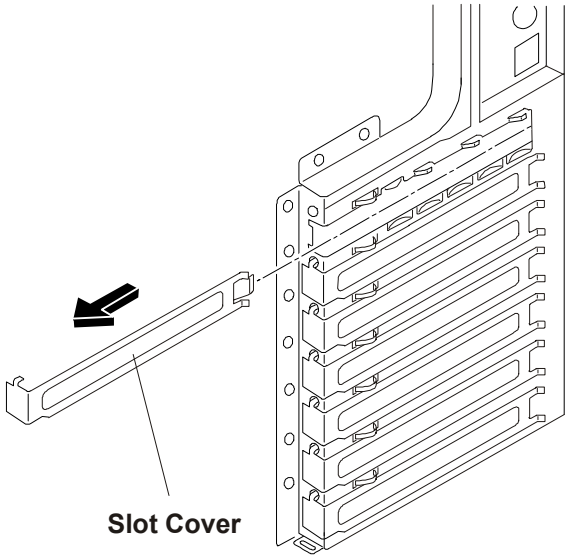


Figure 7-15. Removing the Slot Cover

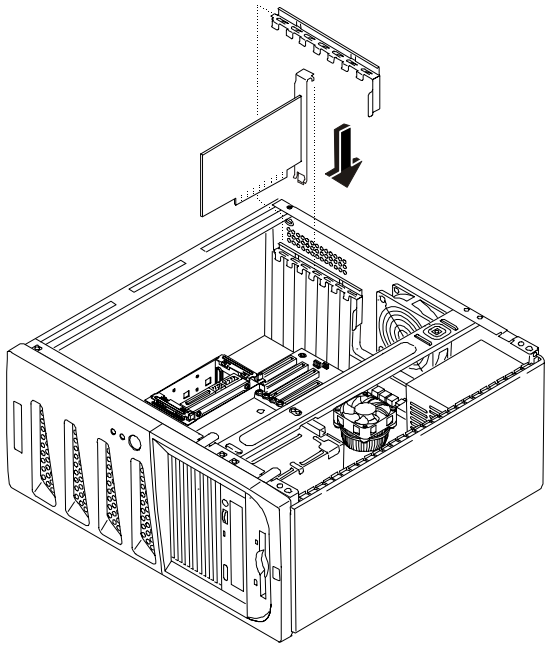


Figure 7-16. Inserting an Accessory Board

7. Replace the slot cover latch to ensure the accessory board is held in place.

8. Replace the left side cover.
9. Replace the external cables and power cord.
10. Power on the Server as described in Chapter 1, “Controls and Indicators.”

    Once the accessory board is installed, you may need to install or update software drivers. The drivers for the new board are either part of your existing Server software or provided on a flexible diskette (or CD-ROM) included with the accessory board.

Power Supply

Removing the Power Supply

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.
2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.
3. Remove the left side cover.
4. Disconnect the power cables from the system board connector and all the mass storage devices.
5. Remove the power supply:
   a. Remove the four outside screws securing the power supply.

      You may need a flat blade screwdriver to remove the four screws.
   b. Remove the screw securing the power supply on the inside of the server.

WARNING	To prevent the power supply from falling, support the power supply with your hands when you disconnect the screw securing the power supply on the inside the chassis. The power supply is heavy and could hurt you or damage components on the system board.

   c. Slide the power supply out of the chassis while you support it with your hands.

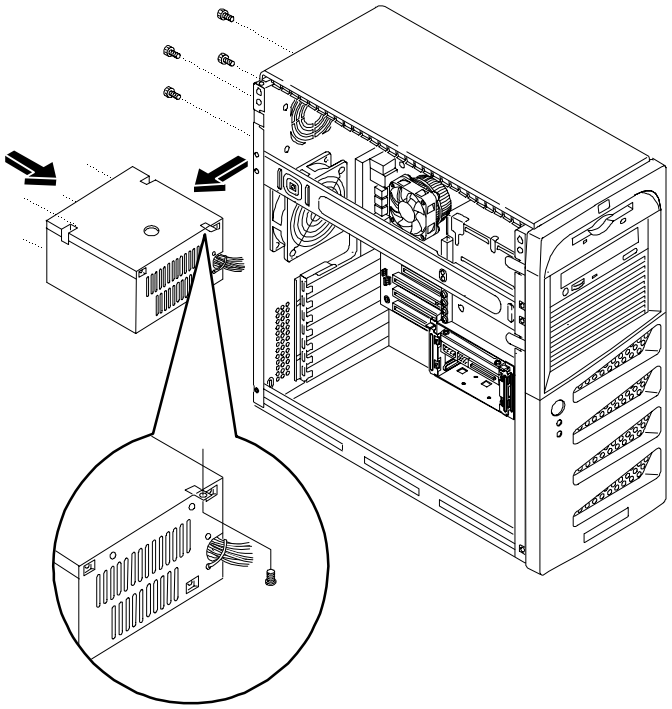


Figure 7-17. Removing the Power Supply

Replacing the Power Supply

1. Insert the new power supply and replace the screw securing it on the inside of the chassis.
2. Replace the remaining screws securing the power supply.
3. Reconnect all internal power supply connectors.
4. Replace the left side cover.
5. Replace the external cables and power cord.
6. Select the correct voltage setting for your country.
7. Power on the Server as described in Chapter 1, “Controls and Indicators.”

Battery

Removing the Battery

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.
2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.
3. Remove the cover.

WARNING	The power supply will continue to provide standby current to the HP Server until the power cord is disconnected from the AC power source.

4. Lay the Server on its side (components showing) for better access to the battery, especially when it is released from the socket.
5. If necessary, remove any accessory boards or SCSI cables that prevent access to the battery socket.

6. Insert a small flat-blade screwdriver or similar tool between the battery and spring latch. See Figure 7-18.
7. Push the spring latch away from the battery to release it, and remove the battery.

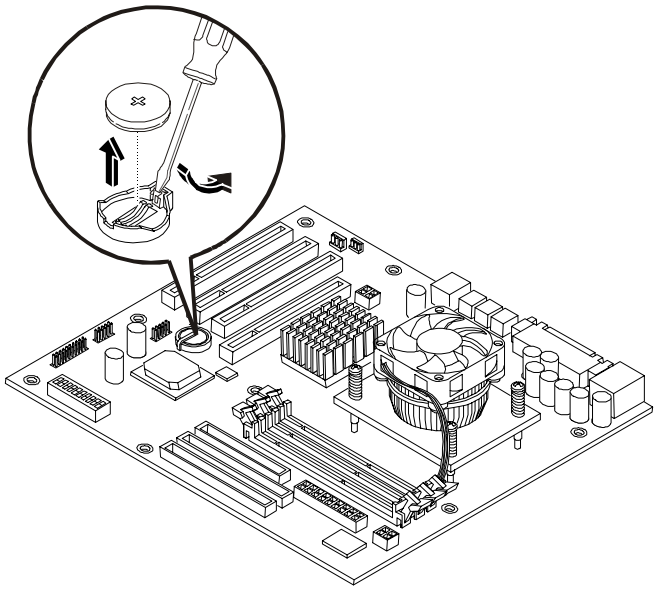


Figure 7-18. Removing the Battery

Replacing the Battery

1. Insert the new battery with the positive sign (+) facing out, and ensure that it is seated completely.

   Ensure the retaining latch is in place, and holds the battery firmly.
2. If necessary, replace any accessory boards or SCSI cables removed to allow access to the battery socket.
3. Replace the left side cover.
4. Replace the external cables and power cord.
5. Power on the Server as described in Chapter 1, "Controls and Indicators."
6. Press F2 during the boot process to enter the (BIOS) Setup Utility and change the BIOS settings.

Chassis Fan

Removing the Chassis Fan

The chassis fan is mounted at the rear of the chassis.

WARNING	Before removing the cover(s), always disconnect the power cords and unplug telephone cables. Disconnect the power cords to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects, such as tools or jewelry. Disconnect telephone cables to avoid exposure to shock hazard from telephone ringing voltages. The power switch does not turn off any standby power. Disconnect the power cord to stop or turn off standby power.

Follow these instructions to remove the chassis fan:

1. If the Server is operating, power off the Server.

   Refer to Chapter 1, "Controls and Indicators" for instructions.

2. Disconnect the power cord and any external cables connected to the Server.

   If necessary, label each one to expedite re-assembly.

3. Disconnect the chassis fan's power connector from the system board.

   Note the orientation of the fan's power cable.

4. Remove the fan by placing a sharp flat object (screwdriver or knife) under the edge of the mounting snap rivet.
5. Lift the snap rivet away from the surface of the rear chassis.
6. Remove the snap rivet housing from the rear of the chassis.

CAUTION	To prevent damage from the fan if it falls, support the fan when you release the last snap rivet and the snap rivet housing. The fan could fall onto the system board or an accessory board causing damage, if not supported when released.

7. Repeat Steps 3-6 for the three remaining snap rivets.

   Ensure you catch the fan when you remove the last snap rivet housing.

8. Lift the fan out and away from the chassis.

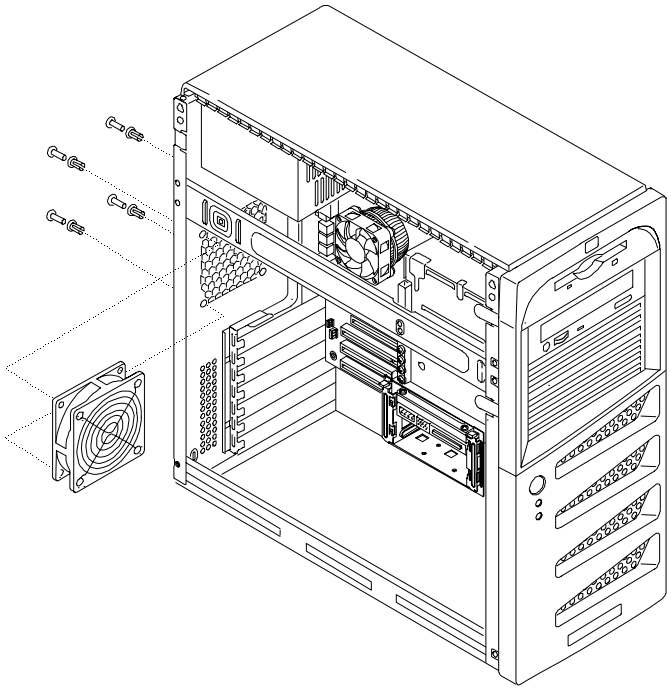


Figure 7-19. Removing the Chassis Fan

Replacing the Chassis Fan

1. Remove the replacement chassis fan from the shipping container.
2. With the power connector oriented toward the rear of the chassis and the system board, guide the chassis fan into the chassis fan opening.
3. Attach the chassis fan by placing the first snap rivet housing into the chassis and then pushing the snap rivet into the housing.
4. Repeat Step 3 for the three-remaining snap rivet housings and snap rivets.
5. Connect the chassis fan's power connector.

6. If necessary, replace any accessory boards removed to allow clear access to the fan.
7. Replace the left side cover.
8. Replace the external cables and power cord.
9. Power on the Server as described in Chapter 1, “Controls and Indicators.”
10. Verify the chassis fan is operating correctly.

System Board

Removing the System Board

1. If the Server is operating, power down the Server.

   Refer to Chapter 1, “Controls and Indicators” for instructions.
2. Disconnect the power cord and any external cables.

   If necessary, label each one to expedite re-assembly.
3. Remove the left side cover.
4. Lay the Server on its side (components showing).
5. Remove any accessory boards mounted on the system board.
6. Disconnect all cables connected to the system board.

   If necessary, label each one to expedite re-assembly.
7. Remove DIMMs, heat sink-cooling fan and the processor, placing the components on an anti-static pad.
8. On the rear panel, remove the external cover, labeled “REMOVE ONLY TO SERVICE SYSTEM BOARD.” Using a flat-blade screwdriver, slide the blade under the cover and lift to remove.
9. Remove all the screws securing the system board to the chassis.
10. Remove the old system board by carefully disengaging the rear connectors and then carefully lifting it out and away from the chassis.
11. Place the system board on an anti-static pad and record all jumper connections.
12. Place the system board in an anti-static container.

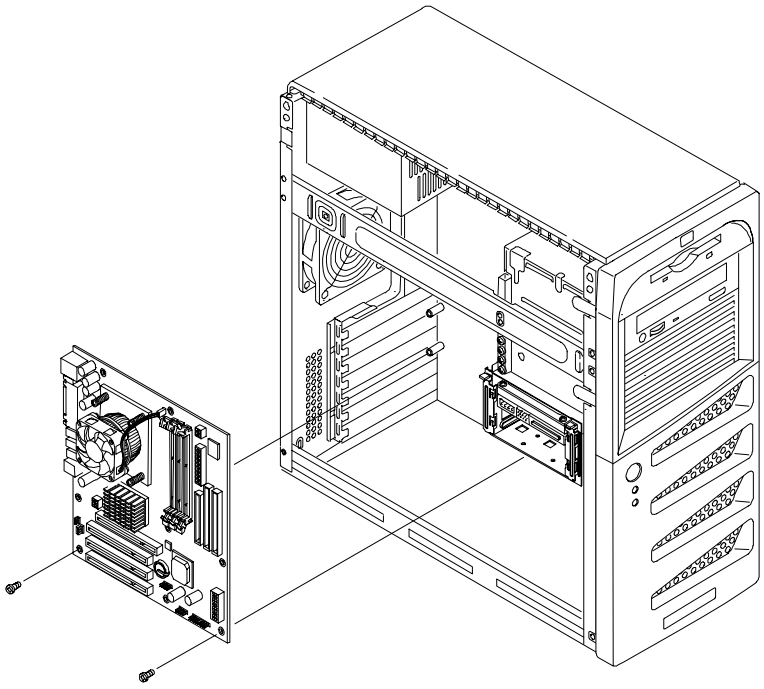


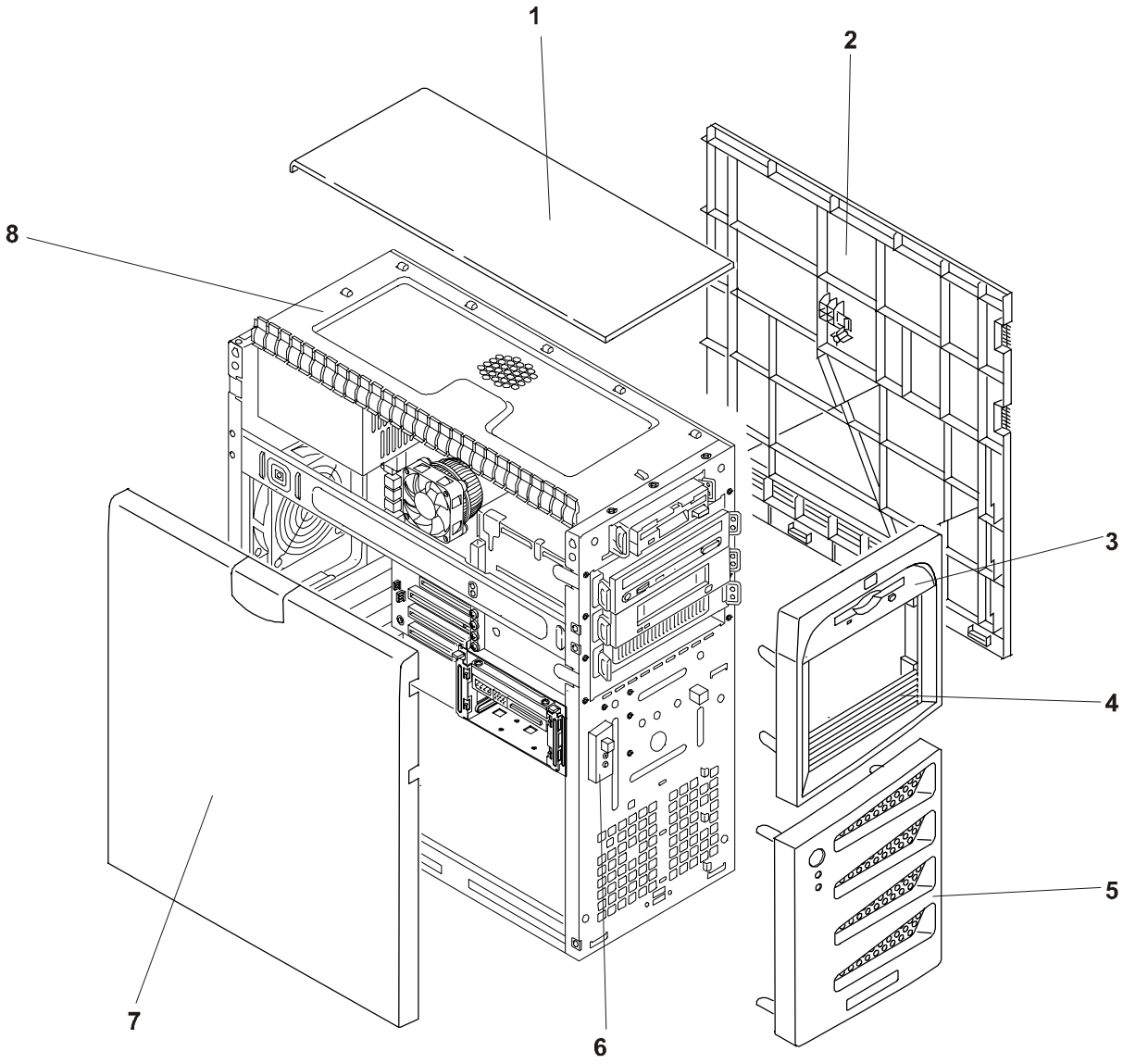
Figure 7-20. Removing and Replacing the System Board

Replacing the System Board

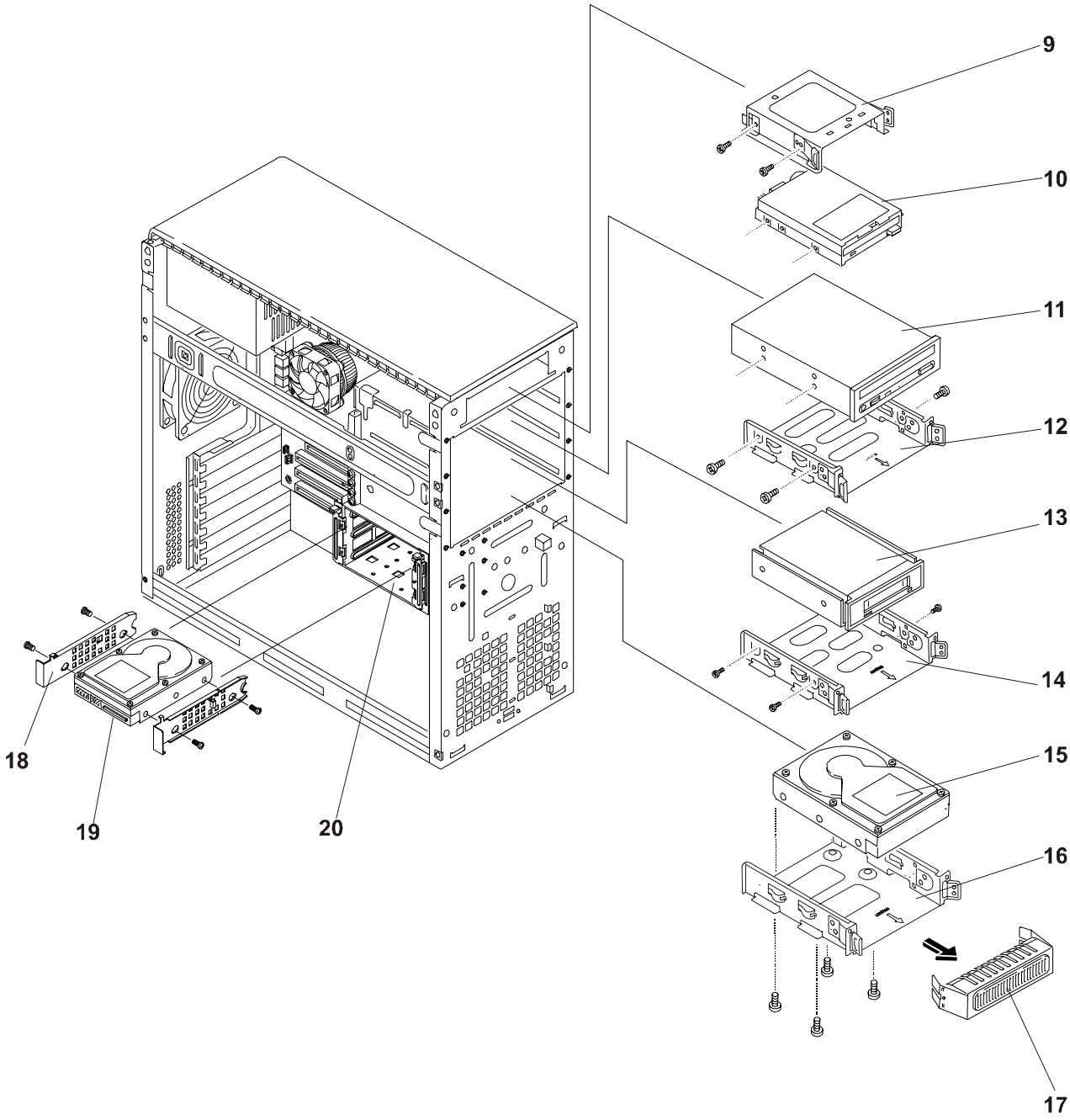
1. Remove the replacement system board and any cables from the anti-static shipping container.
2. Place the system board on an anti-static pad and set all jumper connections as recorded during the system board removal.
3. Insert the new system board, lining up the rear connectors carefully.
4. Install all the screws into the system board to secure it to the chassis.
5. Replace all cables that were disconnected during the previous removal.
6. Replace the DIMMs, processor and heat sink-cooling fan and accessory boards.
7. Replace the external cover on the rear panel. Place the cover over the ports and press to snap it in place.
8. Replace the left side cover.
9. Return the Server to the upright position.
10. Connect the power cord and any external cables to the Server.
11. Power on the Server as described in Chapter 1, “Controls and Indicators.”
12. Enter the (BIOS) Setup Utility and set the BIOS configuration.
13. Reboot the Server and verify the Server is operating correctly.

8 Parts Identification

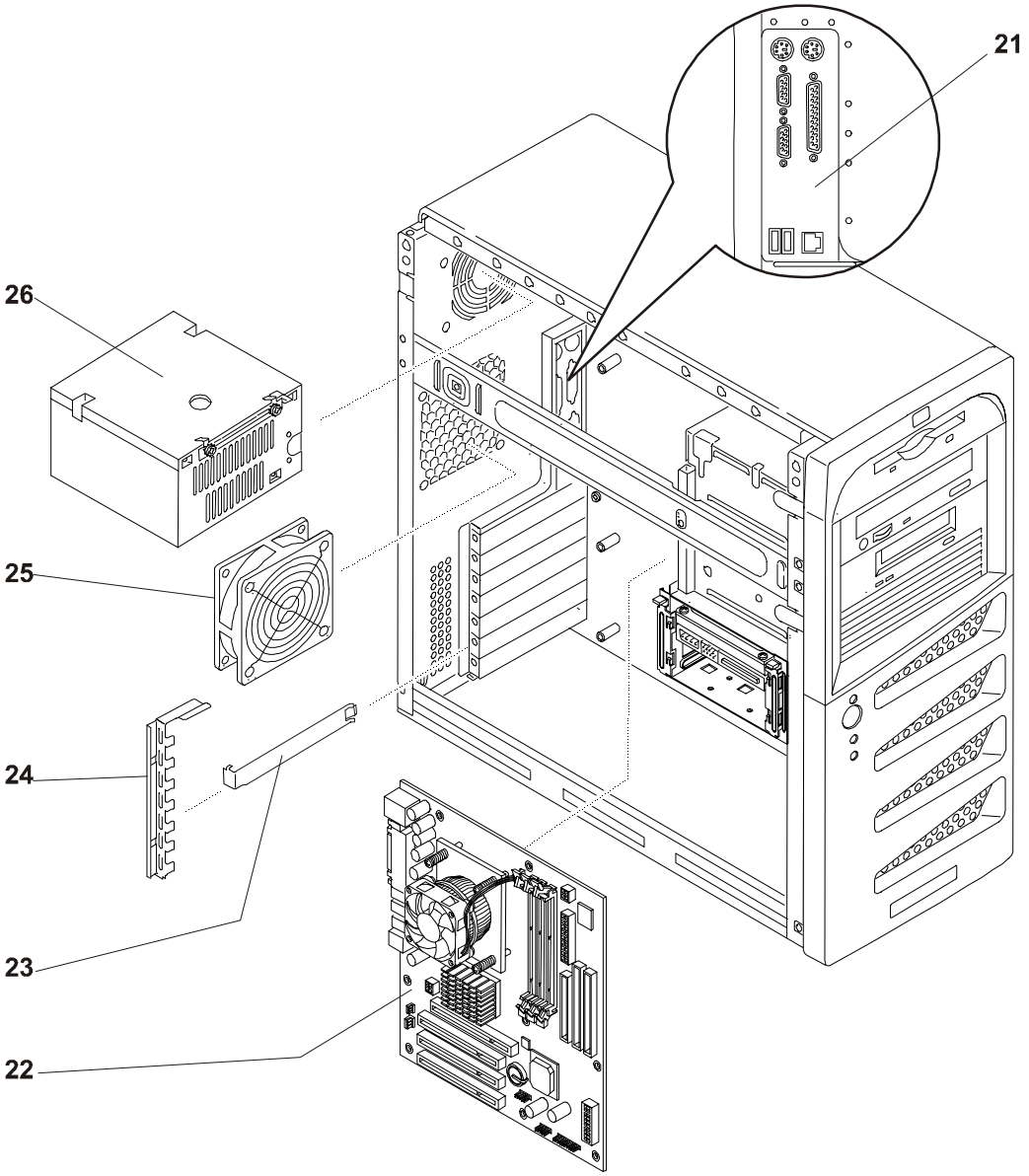
Exploded View – Covers and Bezels



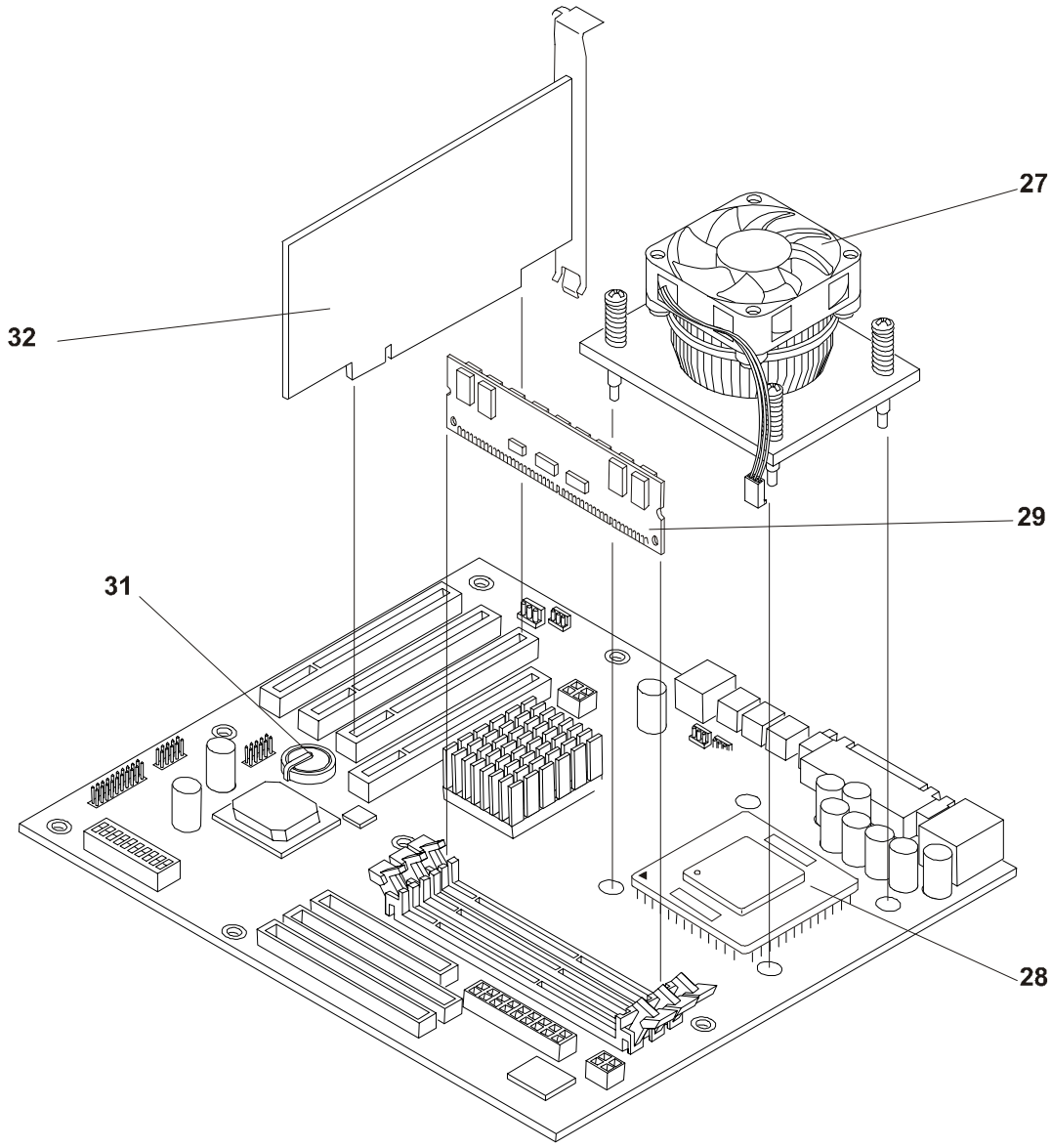
Exploded View – Mass Storage Devices



Exploded View – Chassis Fan, Power Supply, and System Board



Exploded View – System Board Components



Replaceable Parts List

The items in this list and the corresponding item numbers in the respective Exploded Views apply to both models of the HP Server, except where noted.

NOTE The part numbers listed below were available at the time of publication. Part numbers may change after publication. Order parts by the number listed below; HP's parts price list database will generally contain a reference to the revised part number. If a system board needs to be replaced, remove processor modules, DIMMs, or adapter boards and transfer these to the new board. Ensure all jumper and switch settings on the old board are transferred to the new board.

Item No.	Description	Replacement	Exchange
1	Top Cover	A7777-40008	
2	Right Side Cover (not removable)	Not available	
3	Upper Front Bezel	P5498-63004	
4	Filler Panel (5¼") with vents	P4648-63006	
5	Lower Front Bezel	P5498-63005	
6	Control Cable Kit	5065-8930	
7	Left Side Cover	P5498-67003	
8	Chassis	Not available	
9	FDD (Flexible disk drive) tray	D2035-60293	
10	Flexible disk drive 3 1/2 inch	D2035-60293	
11a	CD-ROM Drive 48x IDE	D4348-60003	
11b	DVD Drive 16x/40x	P4388-63006	P4388-69006
12/14	CD-ROM Tray		
13	Tape Drive, SureStore, DAT24I (Optional)		
14/12	Backup Tape Drive Tray		
15a	Hard Disk Drive 40 GB, 7200 RPM (IDE model)	P7678-67001	P7678-69001
15b	Hard Disk Drive 80 GB, 7200 RPM (IDE model)	P7679-67001	P7679-69001
15c	Hard Disk Drive 18 GB, 10K RPM (SCSI model)	P1167-63001	P1167-69001
15d	Hard Disk Drive 36 GB, 10K RPM (SCSI model)	P1169-63001	P1169-69001
15e	Hard Disk Drive 73 GB, 10K RPM (SCSI model)	P3578-63001	P3578-69001
16	5 1/4 inch Tray for 3rd HDD		
17	Spacer/shield (RFI)	Not available	
18	Drive Rails		
19a	Hard Disk Drive 40 GB, 7200 RPM (IDE model)	P7678-67001	P7678-69001
19b	Hard Disk Drive 80 GB, 7200 RPM (IDE model)	P7679-67001	P7679-69001
19c	Hard Disk Drive 18 GB, 10K RPM (SCSI model)	P1167-63001	P1167-69001
19d	Hard Disk Drive 36 GB, 10K RPM (SCSI model)	P1169-63001	P1169-69001
19e	Hard Disk Drive 73 GB, 10K RPM (SCSI model)	P3578-63001	P3578-69001
20	Drive Cage	5065-8945	

Item No.	Description	Replacement	Exchange
21	I/O Panel, Rear	Not available	
22/30	System Board	P5498-67001	P5498-69001
23	Slot Cover	P4648-63012	
24	Slot Cover Latch	P4648-63026	
25	Chassis Fan	5065-4254	
26	Power Supply, 250 W	0950-4206	
27	CPU heat sink/fan assembly	P5663-63101	
28a	Pentium 4, 1.7 GHz/400 socket N processor	P5664-63001	P5664-69001
28b	Pentium 4, 1.8 GHz/400 socket N processor	P5718-63001	P5718-69001
28c	Pentium 4, 1.9 GHz/400 socket N processor	P5719-63001	P5719-69001
28d	Pentium 4, 2.0 GHz/400 socket N processor	P5665-63001	P5665-69001
29a	DIMM, 128 MB	D8265-69001	D8265-69001
29b	DIMM, 256 MB	A7793-63001	A7793-63001
29c	DIMM, 512 MB	D8267-69001	D8267-69001
31	Battery	1420-0356	
32	SCSI Controller Board (SCSI Model only)	A1280-66502	A1280-69502
*	AGP Video Card (NVida TNT2 16MB)	P5761-63501	
*	Keylock assembly	5064-9154	
*	Audio Port Cover	P5498-63002	
*	Thermal patch for heatsink	A6068-40009	
**	HP Startup CD-ROM		

* This part is not on an exploded view

** This Part Number is revised with each new release

Cables and Part Numbers

Description	Replacement Part Nos.
Data IDE Cable (IDE-1) kit (Floppy , CD-ROM, HDD)	5065-8931
Internal SCSI Cable w/five connectors and termination at end of cable	P4648-63006
SCSI LED Cable	5184-3868
Control Cable Kit (includes power switch and cable, and intrusion switch and cable)	P5498-630xx

Keyboards

Language	Part Number	Language	Part Number
US	**C4735-60301CP**	Danish	D4950-63016
Arabic/French	C4735-60125	French Canadian	C4735-60302C
Portuguese	C4735-60319	German	C4735-60303
Cyrillic	C4735-60330	Spanish	C4735-60304C
Belgian/Flemish	C4735-60314	Spanish Latin America	C4735-60308C
Italian	C4735-60317	French	C4735-60305
Arabic/English	C4735-60320	Norwegian	C4735-60309
Polish	C4735-60138	Swiss	C4735-60311
Hungarian	C473560337	Swedish	C4735-60312
Turkish	C4735-60334	UK	C4735-60313
Greek	C4735-60333	Czech	C4735-60336
Taiwan	C4735-60323	Dutch	C4735-60306

Power Cords

Country	Part Number	Country	Part Number
Australia/New Zealand	8121-0524	India/South Africa	8121-0520
Canada/United States	8120-1378		
Denmark	8121-0518	Switzerland	88121-0519
Europe	8121-0516	United Kingdom	8120-0517

9 Specifications

This appendix provides the operating conditions (environmental requirements), hardware specifications, physical requirements, power requirements, and video resolutions of the HP Server tc2110. The system board layout and its connectors are also provided. See Figure 9-1.

The specifications listed may vary if you install a mass storage device in your server that has more stringent environmental limits. Ensure the operating environment for your server is suitable for all of the mass storage devices being used.

Environmental

Temperature

Operating	5° to 35° C (41° to 95° F) at 10,000 ft
Non-operating	-40° to + 65° C (-40° to + 149 F°)

Humidity

Operating	20 % to 80 % relative humidity, non-condensing
Non-operating	5% to 95% relative humidity, non-condensing

Altitude

Operating	-30 to 3,045 m (~ 10,000 ft)
Non-operating	-30 to 12,180 m (~ 40,000 ft)

Thermal Output

Maximum Operating	1312 BTU/hr

Accoustic Emissions

Operating	LpA: <38 dBA

Weight and Dimensions

Weight	Basic configuration approx. 14.8 kg. (32.5 lbs) – excludes keyboard and monitor. Fully loaded approx. 22.5 kg. (50 lbs) – excludes keyboard and monitor.
Height	476mm (18.7 inches)
Width	205mm (8.08 inches)
Depth	467mm (18.3 inches)

Power Supply Specifications

Parameter	**Characteristics**
Input Type	Manual voltage selection
Input – Maximum Range	100 to 127 VAC @ 50/60 Hz 200 to 240 VAC @ 50/60 Hz
Operating Current	100 to 127 VAC: 7.0 A 200 to 240 VAC: 3.5 A
In-rush Current	90 A (cold) 120 A (warm)

Parameter	Characteristics
Operating Power	250 W Continuous

Hardware Specifications

Specification	Characteristics
Processors	This HP Server supports Intel Pentium 4 processors 1.6 GHz and above with 400 MHz FSB and 256KB L2 cache memory
Chipset	Northbridge Brookdale (i845) or Southbridge ICH-2 chip set with 33 MHz PCI and 133 MHz FSB speed support
Memory	Supports up to three SDRAM DIMMS for a maximum total of 1.5 GB. Supported DIMM type and sizes: 128MB, 256MB, or 512MB unbuffered, 168-pin, 3.3 volts, 72 bits wide, ECC single-bit correcting, multi-bit detecting.
Video	Installed AGP video card supports up to 1920 x 1200 at 16.7M colors. For more information, refer to "Video Display Modes" in this chapter.
SCSI	SCSI model only; single channel Ultra-160 SCSI cable (3 connectors), Ultra 160 SCSI LED cable
IDE	Embedded Enhanced-IDE 33/66/100 dual-channel controller.
PCI Bus	Three full-length 32-bit PCI slots at 33 MHz and 5 volts.
LAN	Pro/100 VE Network connection.
I/O	Two Serial ports; one bi-directional parallel port with ECP/EPP high-speed support; PS/2 style mouse and keyboard connectors; two USB ports – supports USB printers, external modems, and mouse and keyboard, but NOS dependant
CD-ROM	Bundled CD-ROM drive; IDE interface; 48x speed or faster. Supports 16x40x max IDE DVD-ROM drive
DVD-ROM	Supports 60x40x max IDE DVD-ROM drive

System Board Layout

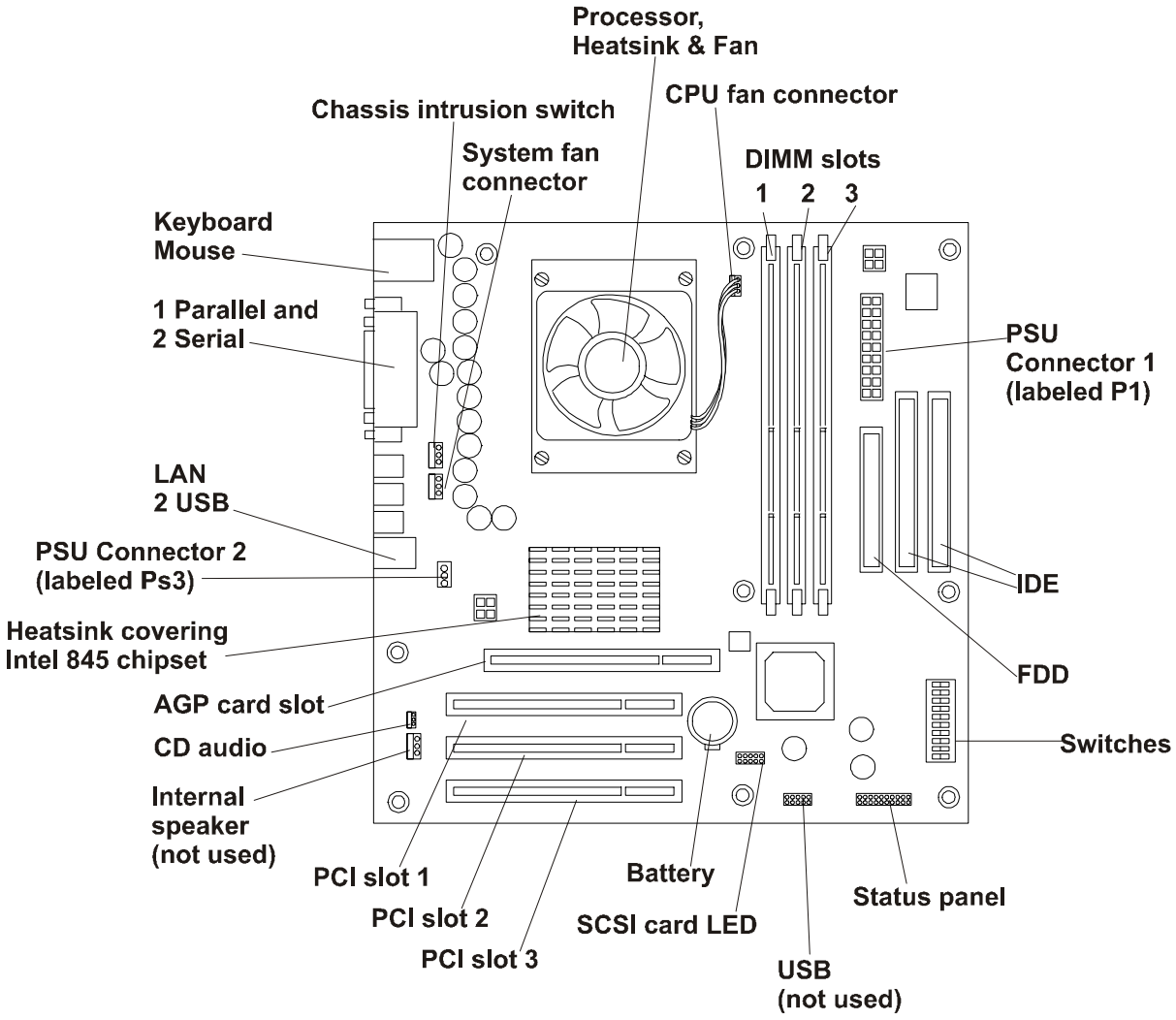


Figure 9-1. System Board Components/Connectors

Index

A
accessory boards
  removing, 91
  replacing, 92
acetone, 58
ACPI
  Advanced Configuration and Power Interface, 6
  Advanced Configuration and Power Managment Interface, 2
Advanced Configuration and Power Interface
  ACPI, 6
ammonia, 58
anti-static wrist strap, 77
arching effect
  power supply, 42

B
backup tape drive
  replacing, 81
battery
  problems, 66
  removing, 95
  replacing, 96
benzene, 58
bezel
  upper front, 15
bezel, upper
  replacing, 18
BIOS
  clearing configuration, 51
BIOS recovery, 60
BIOS Recovery, 61
BIOS reset, 60
BIOS settings
  ACPI features, 46
  IDE master/slave, 45
  system fan speed, 3
BIOS update, 60
BIOS Update, 61
boot device priority
  boot order, 21
boot from CD-ROM
  HP Diagtools Utility, 57
boot order
  boot device priority, 21
  default, 21
  modifying, 21
  slot location, 37
boot order, IDE
  boot drive, 21, 37, 38
  CD-ROM, 21, 37
  flexible disk drive, 21, 37
  PCI slot order, 21, 37
boot order, SCSI
  CD-ROM, 21, 38
  flexible disk drive, 21, 38
  PCI slot order, 21, 38
  SCSI devices, 21, 38
boot priority
  slot location, 37

C
cables, 28
Cables and Part Numbers, 106
cage HDD
  removing, 84
CD-ROM
  eject hole, 69
  problems, 69
  removing, 27, 79
  replacing, 27, 80
chassis fan
  removing, 96
  replacing, 97
CMOS memory
  clearing, 51
Connector Pinouts, 9
cover
  removing left side, 15
  replacing left side, 16
cover guidelines, 15
covers, 28

D
Diagnostic Tests, 49
diagnostics, 49
  Toptools, 54
Diagtools, 53
Dimensions, 109
DIMM sizes
  128 MB, 29
  256 MB, 29
  512 MB, 29
DIMMs
  installation, 29
  installation guidelines, 29
  non-compatible, 29, 86
  open slot configuration, 30
  removing, 32, 85
  replacing, 86
  retaining latches, 32
  slots 1 through 3, 30
  supported memory capacity, 30
drive shelves
  common trays, 20
  drive trays, 20
drive types supported, 2

flexible disk drive, 20
IDE CD-ROM, 20
low-voltage differential SCSI, 20

E
embedded Network Interface Card
problems, 75
Embedded Network Interface Card, 75
error messages
POST, 50
exploded view
covers and bezels:, 101
internal components, 103
mass storage:, 102
system board, 104

F
FDD
removing, 78
replacing, 79
Flexible Disk Drive
Problems, 69
front panel
power switch, 2
front panel
LEDs, 2
Front Side Bus
FSB, 89
front side bus (FSB), 89
front side bus speed, 89
FSB
Front Side Bus speed, 89
FSB speed, 89

G
general information, 109

H
hard drive
limitation, 28
heat sink
thermal interface material, 35, 90
thermal patch, 90
HP Diagtools Utility, 57
HP Startup CD-ROM, 43
run from CD-ROM, 57
HP NetRAID M1 Controller, 23
HP Server
controls, 1
front panel, 1
indicators, 1
inrush current, 6
ports, rear panel, 3
powering up, 5
HP Startup CD-ROM
DOS boot method, 44
HP Diagtools Utility, 43
HTML browser tool, 44
NOS drivers, 43
operation methods, 43
Windows method, 43
HP Toptools, 54

I
IDE HDD cable, 106
inrush current
allowing for, 6
installing
additional memory, 29
DIMMs, 29
Internal SCSI Cable, 106
IRQ settings
automatically assigned, 37

K
keyboard, 41
problems, 68
keyboards
part numbers, 107

L
LAN port
connectors, 13
LED indicator
Drive activity, 2
power, 2
sleep state, 2
LEDs
front panel, 2
lighter fluid, 58
lost clusters, 69
lower bezel
LEDs, 2

M
maintenance, 57
mass storage
installation, 19
mass storage devices
boot device priority, 21
memory
installation, 29
installation guidelines, 29
problems, 75
Mini-DIN
Connectors, 9
monitor
video connection, 41
monitor port, 3
mouse, 41
mouse
problems, 68

N
Network Interface Card, 75
problems, 75
NIC, 75
embedded, 75
problems, 75
NIC, embedded
problems, 75

O
Order Assistant, 29

P
parallel port
  connectors, 10
parts list, 105
PCI boards
  full length, 41
  software drivers, 41
PCI boards
  plastic extension, 41
PCI slots, 36
  five 32-bit slots, 36
  location, 38
ports
  keyboard, 3
  LAN port, 3
  mouse, 3
  two USB, 3
ports
  external SCSI, 3
  keyboard, 41
  mouse, 41
  parallel, 3
  printer, 3
  rear panel, 3
  serial ports, 41
  USB, 41
  video, 3, 41
POST
  failure, 59
power
  none, 59
  problems, 63
power cord
  arching effect, 42
  part numbers, 107
power management
  Sleep States, 6
Power requirements, 109
power supply
  arching effect, 42
  removing, 94
  replacing, 95
power switch
  DC power (front panel), 2
powering-on procedure, 5
Power-On Self-Test (POST), 49
preventive maintenance, 57
printer/datacomm
  problems, 67
processor
  Pin-1 marker, 34, 89
processor
  heat sink-cooling fan, 74
  problems, 74
  removing, 33, 87
  replacing, 34, 89
processor socket
  Pin-1 marker, 34, 89
processors
  overheating, 91

R
read/write errors, 69
rear panel ports, 41
replacing parts, 77
retaining latches
  DIMMs, 31
RFI shield, 28

S
SCSI
  external connector, 3
  Problems, 73
SCSI controller ID, 21
SCSI ID
  setting, 24, 25, 28
SCSI port
  50-pin connector, 12
  68-pin connector, 11
security
  keylock, 3
serial port
  connectors, 9
serial ports, 41
serial ports, 3
shelf HDD
  replacing, 83
shelf mounted
  removing hard disk drive, 81, 82
Sleep States, 2
  Advanced Configuration and Power Interface, 6
  defined, 6
  hibernate, 6
  keyboard or mouse activity, 6
  NOS dependent, 2
  power button, 6
  power button configurations, 7
  power management, 6
  scheduled events, 6
  standby, 6
  suspend, 6
  wake-up events, 6
slot cover
  EMI interference prevention, 40, 41
  special design, 39
specification, 109
switch box
  connection, 42
  keyboard, 42
  monitor, 42
  mouse, 42
system board
  removing, 98
  removing DIMMs, 32
  replacing, 99
System board

components, 111
connectors, 111
system fan
thermal sensor control, 3
variable speed, 3

T
tape backup drive
50-to-68 pin adapter, 21, 82
tape heads, 58
thermal bond
thermal patch, 35, 90
thermal interface material
heat sink, 35, 90
thermal patch
heat sink, 90
thermal bond, 35, 90
tools, 77
tray mounted
removing hard disk drive, 81, 82
trichlorethylene, 58
troubleshooting
heat sink problems, 59
troubleshooting, 57
basics, 57
finding the problem, 58
POST error messages, 50
tools, 57
Web based, 57

U
Ultra-160 SCSI
speed limitation, 28
Uninterruptible Power Supply
UPS, 42
UPS
Uninterruptible Power Supply, 42
USB
connectors, 10
USB devices
external modems, 3, 41
keyboard, 3, 41
mouse printers, 3, 41
NOS dependent, 3
printers, 3, 41
USB support, 3
USB port
connectors, 10

V
Video/Monitor Problems, 64

W
Weight, 109
weight and dimensions, 109

Z
Zero Insertion Force
ZIF, 34, 89
ZIF
release lever, 34, 89
Zero Insertion Force, 34, 89